SOFI WORKING PAPERS IN LABOUR ECONOMICS 13/2025

Local Economic Shocks and Entrepreneurship Dynamics

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SAMMANFATTNING

Denna studie undersöker hur lokala ekonomiska uppgångar påverkar entreprenörskap och företagsutveckling. Studien utgår från den svenska gruvboomen som inleddes år 2004, då internationella råvarupriser steg kraftigt till följd av ökad global efterfrågan. Eftersom prisuppgången inte drevs av förändringar i svensk mineralproduktion möjliggör den en kausal analys av hur förbättrade lokala arbetsmarknadsförutsättningar påverkar individers och företags agerande.

Med hjälp av geokodade registerdata för perioden 2000–2015 jämför författarna individer som bor relativt nära, inom 80 kilometers avstånd, en gruva med individer som bor längre bort, 80–150 kilometer, före och efter gruvboomen. Resultaten visar att individer som bodde nära en gruva uppvisade cirka 40 procent högre sannolikhet att bli entreprenörer efter boomen, relativt nivån innan den ekonomiska uppgången. Effekterna drevs av personer i åldern 31–50 år, med låg utbildning och låg inkomst, som var redan bosatta i området innan 2004 snarare än av inflyttare efter boomen. Ökningen i företagande är koncentrerad till sektorer som ligger nära gruvnäringen, såsom tillverkning och bygg.

Trots att fler individer blev entreprenörer ökade inte antalet nya företag. Istället visar resultaten att många av dessa individer redan drev en verksamhet vid sidan av sin huvudsakliga anställning. När den lokala ekonomin förbättrades skiftade de sin huvudsakliga inkomstkälla från lön till inkomst från näringsverksamhet, ett mönster som tyder på ökad satsning på befintliga företag snarare än nyföretagande. Detta illustrerar hur positiva lokala ekonomiska uppgångar i första hand aktiverar individer med lägst inträdesbarriärer som redan har ett företag, snarare än att leda till skapandet av helt nya företag.

Författarna finner också att etablerade entreprenörer i gruvnära områden förbättrade sina ekonomiska utfall, framför allt genom ökade kapitalinkomster och minskad sannolikhet att lämna entreprenörskapet. Företagen de äger växte i antal anställda och ökade sina lönekostnader, men utan motsvarande förbättring i produktivitet eller rörelseresultat. Detta indikerar att starkare efterfrågan och högre lönenivåer kan verka i motsatta riktningar, vilket kan förklara varför lönsamheten är opåverkad.

SOFI Working Papers in Labour Economics Nr. 13/2025, "Local Economic Shocks and Entrepreneurship Dynamics", är författat av Orsa Kekezi, SOFI, samt Gabriel Rodríguez-Puello (Jönköping International Business School, Jönköping University). Kontakt: Orsa Kekezi, orsa.kekezi@sofi.su.se.

Local Economic Shocks and Entrepreneurship Dynamics

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December 8, 2025

Abstract

This paper examines how local economic shocks affect entrepreneurship, considering entry (extensive margin) and performance of existing entrepreneurs and their firms (intensive margin). Exploiting Sweden's 2004 mining boom as an exogenous shock, we use administrative data (2000–2015) and difference-in-differences estimates comparing individuals within 80 km of a mine to those 80–150 km away. The boom increased entrepreneurial entry but not the number of new firms, as many entrants were hybrid entrepreneurs reallocating effort to existing ventures. Incumbents gained through higher capital income and lower exit risk, while treated firms expanded employment and wage costs without improving operating profits.

JEL classification: L26, R23, Q33, O13

Keywords: economic shocks, mining boom, entrepreneurship, businesses

*Corresponding author. Email: gabriel.rodriguez@ju.se. The authors are grateful to Paul Nystedt, Jonna Rickardsson, Steven Poelhekke, Anja Benshaul-Tolonen, Marcel Garz, Benjamin Larin, Matthew Lindquist, Cristian Granados, Davide Bonaglia, Emma Lappi, Andrea Schneider, Martin Gassebner, Erwan Dujeancourt, and Andreas Diemer for their valuable comments and suggestions in earlier versions of this article. We also benefited from the helpful comments of participants at the internal seminars at Jönköping International Business School (JIBS), the DRUID25 Conference, the 2025 JIBS Paper Development Boot Camp, and the Swedish Institute for Social Research (SOFI). The data used in this article have restricted access; individuals interested in accessing the data can contact the corresponding author for additional details. All remaining errors are our own.

1 Introduction

Entrepreneurship is an important driver of economic growth, for example, by creating new jobs and reallocating market shares away from less productive incumbents (Haltiwanger et al., 2013; Clementi and Palazzo, 2016; Gourio et al., 2016; Adelino et al., 2017; Fairlie et al., 2019; Sedláček, 2020; Bernstein et al., 2022). At the same time, entrepreneurial activity depends on the conditions of the broader economic environment (Glaeser et al., 2015). When these conditions change due to economic shocks, entrepreneurial dynamics are likely to change as well. However, while prior research has shown that local economic shocks have significant effects on labor market outcomes, including employment, earnings, and geographical mobility (Black et al., 2005; Tano et al., 2016; Feyrer et al., 2017; Autor et al., 2013, 2023; Franklin and Labonne, 2019; Foote et al., 2019), we know less about how they shape entrepreneurship. A few recent studies find that positive local shocks can stimulate entrepreneurship and new firm formation at the local level (Unel and Upton Jr, 2023; Decker et al., 2024), but these analyses typically rely on aggregated data, leaving open the question of who responds and through which mechanisms.

In this paper, we examine how local economic shocks influence entrepreneurial dynamics by analyzing (i) entry into entrepreneurship (extensive margin) and (ii) the performance of existing entrepreneurs and their firms (intensive margin). A challenge in the literature is identifying exogenous local shocks, which we address by studying the 2004 mining boom in Sweden. While Sweden has a long tradition of iron ore mining,[1] this boom was driven by the unexpected surge in international resource prices generated by China's increasing demand for commodities, and speculation in the stock markets, rather than shifts in the supply of minerals (Singleton, 2014; Erten and Ocampo, 2013). The international price of minerals suddenly tripled around 2004 and continued to increase until 2011 (SGU, 2021). Exploiting the exogeneity of the shock and the ability to track entrepreneurs and firms over time, we can identify causal effects of how entrepreneurship responds to changes in local economic conditions.

In general, mining booms improve the labor market, attract in-migrants to the areas, and increase local purchasing power (Feyrer et al., 2017; Wilson, 2022; Jacobsen et al., 2023). In Sweden specifically, Rodríguez-Puello and Rickardsson (2024) find that individuals located close to the mines experienced higher employment and earnings after the boom, driven by the mining sector, but also by spillovers into manufacturing, construction, and services. However, while wage employees experience better conditions, the decision to enter entrepreneurship involves a different trade-off. If we think of entrepreneurship as an occupational choice where individuals weigh the returns to wage employment against the risks and rewards of running

[1] In 2013, the mining industry contributed almost SEK 44 billion (≈ USD 6.76 billion), equivalent to 1.3% of the Swedish GDP, and Sweden is considered one of the most attractive mining countries in the world (Swedish Agency for Growth Policy Analysis, 2015).

a business (Lucas, 1978), a boom can affect entrepreneurship in two opposing ways. On the one hand, it can reduce entrepreneurship by increasing the opportunity cost of becoming an entrepreneur, as wage employment becomes relatively more attractive. On the other hand, it can stimulate entrepreneurship through higher household income and higher local demand for goods and services, generating new unexploited opportunities for business creation. Higher household income also relaxes financial constraints, making it easier to cover both start-up and operating costs of a business. Last, individuals on the margin might be more likely to start a business when they know that there are attractive outside options available in case their entrepreneurial venture fails. Which mechanism dominates is therefore an empirical question that requires micro-level evidence on who responds and in what way. The effect of a local economic boom on the performance of existing entrepreneurs and firms is also ambiguous. Increased local demand for goods and services, driven by higher income and in-migration, may enhance the performance of incumbents. However, the boom may attract new entrants, increasing competition. At the same time, improved labor market conditions raise firms' costs, as they must offer higher wages to retain workers. Thus, the net effect depends on whether increased demand outweighs the combined effects of greater competition and higher costs.

To answer our research questions, we rely on geocoded employer-employee register microdata from Statistics Sweden, covering the period from 2000 to 2015. While there is no consensus on how entrepreneurship should be measured, business ownership is one of the most commonly used indicators in the empirical literature (Parker, 2018). Statistics Sweden classifies an individual as a business owner when at least half of their labor income comes from a business they own, which is the primary definition we use in this paper. Moreover, following the literature that incorporated and unincorporated business owners differ in terms of growth orientation, risk-taking, and economic impact (Levine and Rubinstein, 2017), we focus on incorporated business owners. This way, we aim to capture the kind of entrepreneurship that affects the local economy and is in line with mechanisms through which local shocks affect entrepreneurial dynamics.

The analysis is divided into three parts. We start by providing evidence of whether people are more likely to enter entrepreneurship in the treated areas. Second, we analyze how the performance of existing entrepreneurs, defined as those who have owned a limited company for at least two years before the boom, is affected by the shock. Third, we shift the focus to firms and examine the development of firms owned by these entrepreneurs. We further examine how the impacts of the shock vary across different sectors and demographic groups. Empirically, we estimate difference-in-differences (DID) models and event study specifications. We define the treated group as individuals located within 80 km of the nearest mine, while the control group consists of individuals residing between 80 and 150 km away. The 80 km cutoff is primarily chosen because existing evidence shows that the mining boom affected individuals' labor market outcomes up to roughly 80 km from the mines (Rodríguez-Puello and Rickardsson, 2024). The key identifying assumption behind DID is that, absent the mining boom, trends in entrepreneurial entry and performance would have been the same for treated and control individuals or firms. Therefore, by selecting the control group from neighboring areas, we compare two otherwise similar populations that differ primarily in their exposure to the mines. It is nevertheless important that there are no spillovers between the treated and control groups. To address this concern, we also show specifications using alternative treated groups, where we allow a spatial buffer between the treated and control areas. The estimates remain unchanged across these different specifications.

First, results show that treated individuals are 0.6 percentage points more likely to enter entrepreneurship relative to non-treated individuals after the boom, corresponding to a 40% increase relative to the pre-treatment sample mean. Individuals who respond are between 31 and 50 years old, with low education, and low pre-treatment income. Moreover, the increase in entrepreneurship was driven by residents living near the mines rather than by in-migrants who moved to the area after the shock. This is an important distinction given that the literature shows that local booms increase in-migration flows (Wilson, 2022; Rodríguez-Puello and Rickardsson, 2024). Therefore, the observed of entrepreneurship may be a combination of the effects of the mining boom on entrepreneurship and endogenous movement decisions made by individuals who migrated to the mining areas (Winters et al., 2021). The increase in entrepreneurship is concentrated in mining, manufacturing, and construction. However, this rise in individual entrepreneurship does not translate into a clear increase in new firms. While puzzling, the rich register data can help understand this pattern. The largest share of the response comes from hybrid entrepreneurs - individuals who were business owners at the same time as having wage employment - whose primary income source shifted toward their existing ventures. Taken together, these results suggest that the boom pushed existing entrepreneurs to likely reallocate effort toward their ventures, allowing residents to capture the rents from improved economic conditions.

Second, when examining the performance of incumbent entrepreneurs, the results show positive effects from the boom, including higher capital income and a lower probability of exiting entrepreneurship in the treated areas. We see no significant effects on labor income. These patterns suggest that entrepreneurs are more likely to extract income through dividends rather than wages, reflecting the more favorable tax treatment of dividends (up to a threshold) under Swedish tax law. Third, our results show that firms owned by treated entrepreneurs also perform better in terms of employment, but their labor costs also increase. As a result, we see no statistically significant effects on operating profit. These findings are robust to a battery of tests and alternative definitions of treatment and control groups.

This paper relates to and contributes to different strands of the literature. First, it contributes to the existing literature on the labor market determinants of entrepreneurship, and it builds on work examining the effects of positive local economic shocks on entrepreneurship. Existing studies, often using data aggregated at the county or municipality level, show that local booms, such as the U.S. shale oil and gas boom, stimulate the creation of new establishments and firms, as well as entry into entrepreneurship (Unel and Upton Jr, 2023; Decker et al., 2024). These effects tend to be pro-cyclical, where entrepreneurship increases during booms and reduces during busts (Unel and Upton Jr, 2023). Similarly, Bernal et al. (2024) exploits Colombia's peace agreement as a positive shock and finds an increase in new firm formation.[2] However, by focusing on aggregate outcomes, these studies largely capture place-level effects. Our contribution to this literature is that we rely on register individual-level data to estimate the effect of a positive economic shock on the transition into entrepreneurship. Examining this issue at the individual level is important because the focus of the analysis is shifted from places to people (Jacobsen et al., 2023). Relying on administrative data allows for an extensive analysis of the effect of economic shocks on entrepreneurial endeavors and the mechanisms behind them. Moreover, it allows us to thoroughly examine who responds to these shocks in terms of different demographic groups and whether residents or migrants drive the effects. For example, positive economic shocks that improve local labor market conditions may attract entrepreneurs to move there, and aggregated measures will overstate the effects on residents. This is important because aggregate analyses and place-based studies may provide misleading policy decisions. To our knowledge, the only comparable individual-level study is Bernstein et al. (2022), which examines local booms in Brazil identified through agricultural price fluctuations, finding that when local opportunities increase, there is significant new firm creation mostly driven by young and skilled individuals. We complement and extend this work by analyzing a similar economic shock, mining booms, in a different institutional and geographic context. We further extend this prior work by not only examining entry into entrepreneurship but also studying the performance of incumbent entrepreneurs and their firms. By combining individual and firm-level administrative data, we provide a more comprehensive understanding of how local economic booms affect both entrepreneurial dynamics and firm outcomes.

Second, the paper relates to the literature on economic shocks and firm performance, which documents heterogeneous effects of resource booms. Allcott and Keniston (2018) finds positive impacts on productivity and employment, with firms adjusting on either the extensive

[2] Other papers have primarily examined the broader economic effects of resource shocks, while also offering evidence on entrepreneurial activity. Some find negative impacts (Tsvetkova and Partridge, 2017; Davis and Haltiwanger, 2001; Betz et al., 2015), whereas others report modest positive effects (Jacobsen and Parker, 2016), mainly due to different contexts. From a historical perspective, Stuetzer et al. (2022) shows that areas affected by the 19th-century U.S. gold rush exhibit persistently higher rates of entrepreneurship, whereas Glaeser et al. (2015) finds that historical mining cities in the U.S. remain less entrepreneurial today. Related work at the cross-national level yields mixed evidence, often depending on institutional quality (Farzanegan, 2014; Chambers and Munemo, 2019; Awoa et al., 2022). Last, a separate but related strand of literature explores how entrepreneurship responds to broader business cycle fluctuations (Levine and Rubinstein, 2018; Fossen, 2021).

(opening more plants) or intensive margin (increasing hiring). In contrast, De Haas and Poelhekke (2019) and Pelzl and Poelhekke (2021) show that resource booms can hinder firms in tradable or labor-intensive sectors, while benefiting non-tradable or capital-intensive ones. Similarly, Heresi (2023) documents how Chile's copper boom slowed aggregate manufacturing productivity by reallocating market share away from exporters and capital-intensive firms. By combining firm-level data with information on entrepreneurs, we capture both the intensive and extensive margins and explore how local booms affect incumbent entrepreneurs and firms.

Third, we connect our findings to the growing literature on hybrid entrepreneurship, which highlights how individuals combine wage employment with starting a business. This allows them to gain experience, test their business ideas while still not taking on too much risk, to then transition into full-time entrepreneurship if the venture proves viable (Folta et al., 2010; Raffiee and Feng, 2014; Demir et al., 2020; Kuske et al., 2025). Our results suggest that the entrepreneurship observed following the boom, in part, reflects such hybrid activity. Last, our work contributes more broadly to research on local shocks, such as the China shock (Autor et al., 2013; Caliendo and Parro, 2023) or resource booms in other contexts (Black et al., 2005; Costa et al., 2016; Feyrer et al., 2017; Diemer, 2024; Rodríguez-Puello and Rickardsson, 2024), and to the literature on the Dutch Disease and resource curse, especially regarding labor markets in resource dependent local areas (Ploeg, 2011; Caselli and Michaels, 2013).

The remainder of the paper is organized as follows. Section 2 presents the data, sample, and period of analysis, and shows the empirical methodology. Section 3 presents the empirical results. Finally, in section 4, a discussion of the findings and conclusions can be found.

2 Data and research design

2.1 Data

To examine the role of the mining boom on entrepreneurship dynamics in Sweden, we rely on geocoded employer-employee register data provided by Statistics Sweden from 2000-2015. The data is of yearly frequency, and the outcomes are measured in November each year. The dataset is rich and contains information on all individuals above age 16, including age, gender, education, income, and household characteristics. The data also includes information on employment, occupation, industry, and geographical identifiers for both residence and workplace, measured at the grid-square level (250×250 meters in urban areas and 1,000×1,000 meters in rural areas). We restrict the sample to individuals between 18 and 65 who appear in five or more annual observations consecutively in the sample. In our main specification, we also exclude individuals who moved within 150 km of the nearest mine in 2004 or later, whom we define as migrants. We assume that those who migrated to this area after the shock did so in response to improved labor market conditions. Therefore, including them would confound the effects of the boom with endogenous migration responses (Winters et al., 2021).[3] The employer-employee feature of the dataset allows us to match individuals with firms which they own or are employed at. Firm registers provide information on key firm characteristics such as employment, profit, or value-added (productivity).

The analysis is structured into three parts. First, we examine whether the likelihood of individuals becoming entrepreneurs is affected by the shock. Since we can track individuals over time, the longitudinal structure of the data allows us to reliably study mobility into and out of entrepreneurship. We define entrepreneurs as business owners whose primary source of income comes from owning a limited company. While defining entrepreneurs is a debated issue among entrepreneurship scholars, focusing solely on individuals who start limited liability companies is a better proxy of entrepreneurship because unincorporated entrepreneurs have little ambition to grow their businesses. Incorporated firms on the other hand, usually signal an orientation toward larger investments that demand higher levels of nonroutine cognitive skills, more in line with the type of entrepreneurship associated with innovation and economic growth (Levine and Rubinstein, 2017).

Second, we examine how the mining boom affected the performance of existing entrepreneurs, defined as individuals who have been entrepreneurs for at least two years before the shock. We measure performance via their income and exit from entrepreneurship. We use three different measures of income: disposable income, labor income (earnings), and capital income. We include both labor and capital income, as entrepreneurs can obtain income from their firms through wages, dividends, or a combination of both. Disposable income is the sum of all incomes, including benefits (e.g., child allowances, social benefits, and housing benefits) minus final tax. We obtain a comprehensive understanding of entrepreneurial performance by considering these different income measures. All income variables are yearly and adjusted to real values with the base year 2000 using the national CPI. To avoid typical problems of zeros in the outcome variables (Chen and Roth, 2024; Mullahy and Norton, 2024), we measure income in levels. Therefore, the coefficients can be interpreted as the effect on income as measured directly in 1000 Swedish krona (in 1000 SEK). Besides income, we also measure performance through exit from entrepreneurship, where we define exit as a change in employment status from entrepreneurship to employment or unemployment.

Third, we shift the focus from entrepreneurs to the firms they own and examine how the mining boom affected firm performance. When firms have multiple establishments, we keep the establishment with the highest number of employees. In the low number of cases where multiple firms are owned by the same entrepreneur, we retain all the firms. We measure firm performance using employment, value-added per employee, wage costs per employee, and operating profit. Because operating profit contains many zeros, we use an inverse hyperbolic transformation (arcsinh), which behaves similarly to the logarithm but is well-defined at zero

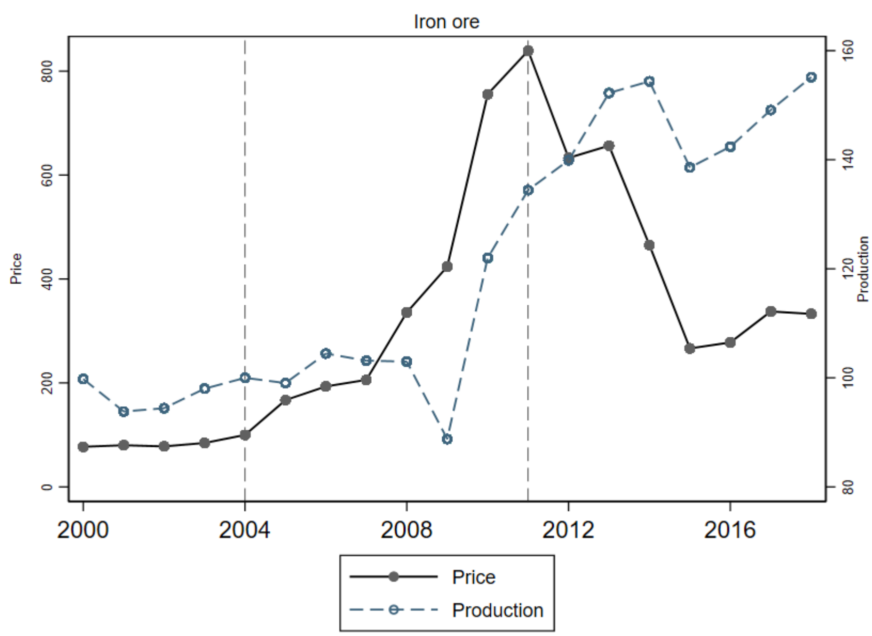
[3] For robustness, we also present the results with both residents and migrants, and results for only migrants.

(Chen and Roth, 2024).[4]

2.2 Measuring exposure to the shock

We exploit the mining boom as a source of exogenous variation in local economic conditions. Northern Sweden has a long tradition of iron ore mining (Haley et al., 2011; Tano et al., 2016). However, the boom in 2004 was primarily driven by the unexpected increase in international resource prices generated by China's increasing demand for commodities and speculative investor flows in the stock markets (Radetzki et al., 2008; Singleton, 2014), rather than changes in mineral supply (Erten and Ocampo, 2013; Kilian, 2009, 2014). Figure 1 shows the development of iron ore international prices and Swedish production between 2000 and 2018. The iron ore price started rising in 2004, peaked in 2011, and then declined. It increased by 67% from 2004 to 2005 and continued to grow rapidly in the following years (Tano et al., 2016).[5]

Figure 1: Price and production for iron ore in overall Swedish production, 2000–2018



Notes: Price and production are normalized to 2004 values (2004=100). Data are obtained from SGU (2021) and the International Monetary Fund.

We consider the three iron ore mines that were continuously operating during the mining boom period: the Malmberget mine located in Gällivare municipality and the Kirunavaara

[4] For the estimation on operating profit, all firms with negative profits are removed from the sample. The results for employment, value-added per employee, and wage costs per employee are reported for the full sample, and they remain robust when applied to this reduced sample.

[5] We observe a sharp decrease in iron ore production in 2009, which we attribute to the global financial crisis. Mineral production in Sweden has, however, recovered and even almost doubled since then (SGU, 2021). A possible reason is that exploration activities and investment in the sector peaked in 2008 and 2011, with more than 750 million SEK being invested each year (Tano et al., 2016).

and Gruvberget mines in Kiruna municipality. These are all existing mines, with Kirunavaara opening in the 1860s, and Malmberget in the 1820s. We focus on existing mines instead of the opening or closing of mines since that was rare during this period and does not provide sufficient variation for empirical analysis. Moreover, they are central to the labor market dynamics of these municipalities, employing a substantial share of the workforce. Mining employment shares increased from 17.4% to 22.6% in Gällivare and from 13.9% to 18.4% in Kiruna between 2003 and 2015, highlighting their growing importance during the boom.

To quantify the exposure to mining, we construct a measure of the distance from the individual's residential location to the nearest mine, depending on the coordinates of the grid where they reside. The grids are 250 by 250 meters in urban areas and 1000 by 1000 meters in rural areas.[6] We define treated individuals as those residing within 80 km of the mines, while those located 80–150 km away serve as the control group. By limiting the sample to those individuals located at a maximum distance of 150 km from the nearest mine, we avoid including people located in large cities and make sure to compare similar observations.

This approach, also known as the ring method, compares average changes in outcomes between the inner treated ring and the outer control ring. Previous studies have used different bounds to define treatment depending on the outcome of interest (Wilson, 2012; Von der Goltz and Barnwal, 2019). We choose 80 km as the cutoff for two main reasons. First, northern Sweden is sparsely populated, and the labor markets are usually large as people often commute long distances for work. Second, Rodríguez-Puello and Rickardsson (2024) find evidence that the mining boom in Sweden affects the labor market conditions of individuals as far as 83 km from the mines. Nevertheless, the 80 km threshold is ultimately arbitrary. To ensure that this choice does not drive the results, we conduct several sensitivity analyses in subsection 3.4, including alternative definitions of treatment based on different distance cutoffs.

Combining the exogeneity of the boom with spatial data, we argue that, before the shock, the likelihood of individuals entering entrepreneurship as well as firm and entrepreneurial performance was similar between the treatment and control groups. Following the mining boom, individuals within 80 km of the mines were exposed to the boom in a quasi-random manner. Therefore, there is no reason to expect that their post-shock entrepreneurial choices or performance were driven by other unobserved characteristics unrelated to the mining boom. Online Appendix Figure B.1 shows the locations of the mines considered and an approximation of the treated and control rings. Table 1 presents the means and standard deviations of all the variables for the treated and control groups before (2000-2003) and after (2004-2015) the mining boom. The descriptive statistics confirm our expectations about the similarity of individuals between groups before the boom; they had similar rates in terms of

[6] Online Appendix Figure B.2 shows the distribution of individuals in the distance to the nearest mine within 500 km and zooming into 150 km.

marital status and having children under 18. As expected, given their proximity to mines, treated areas had higher shares of employment in the primary sector.

Table 1: Summary statistics, 2000-2003 and 2004-2015

	2000–2003			2004–2015		
	Control	Treated	Total	Control	Treated	Total
Entrepreneur	0.021	0.013	0.015	0.028	0.026	0.026
	(0.144)	(0.114)	(0.122)	(0.166)	(0.158)	(0.160)
Distance to mine(km)	119.058	15.446	42.002	118.953	14.916	39.771
	(19.359)	(23.184)	(50.419)	(19.255)	(22.785)	(49.515)
Married	0.483	0.422	0.438	0.435	0.368	0.384
	(0.500)	(0.494)	(0.496)	(0.496)	(0.482)	(0.486)
Children under 18	0.361	0.376	0.372	0.320	0.345	0.339
	(0.480)	(0.484)	(0.483)	(0.467)	(0.475)	(0.473)
Primary education	0.688	0.615	0.633	0.588	0.519	0.536
	(0.463)	(0.487)	(0.482)	(0.492)	(0.500)	(0.499)
Secondary education	0.240	0.299	0.284	0.323	0.374	0.362
	(0.427)	(0.458)	(0.451)	(0.468)	(0.484)	(0.481)
Tertiary education	0.072	0.087	0.083	0.089	0.106	0.102
	(0.258)	(0.281)	(0.276)	(0.285)	(0.308)	(0.303)
Non-employed	0.356	0.278	0.298	0.249	0.194	0.207
	(0.479)	(0.448)	(0.457)	(0.432)	(0.395)	(0.405)
Primary sector	0.094	0.166	0.147	0.152	0.225	0.208
	(0.292)	(0.372)	(0.354)	(0.359)	(0.418)	(0.406)
Secondary sector	0.088	0.052	0.062	0.081	0.048	0.056
	(0.284)	(0.223)	(0.240)	(0.273)	(0.214)	(0.230)
Tertiary sector	0.462	0.504	0.493	0.518	0.533	0.529
	(0.499)	(0.500)	(0.500)	(0.500)	(0.499)	(0.499)
Nxt	36317	105379	141696	91198	290542	381740
N	9079	26345	35424	7600	24212	31812

Notes: Mean and standard deviation (in parentheses). Treated: $\leq 80km$, control: 80-150 km. Primary sectors include extraction and agriculture, secondary include manufacturing and construction, and tertiary include services, healthcare, the public sector, and others.

2.3 Empirical framework

We examine how local economic shocks affect entrepreneurial dynamics, focusing on (i) entry into entrepreneurship, (ii) the performance of incumbent entrepreneurs, and (iii) the outcomes of their firms. Our identification exploits the timing of the global mining boom in 2004 and variation in exposure determined by geographical proximity to mines. Following the literature, we treat the location of mines as plausibly exogenous because it depends on the local geology (Pelzl and Poelhekke, 2021; Christian and Barrett, 2024). We implement a DID approach that compares individuals within 80 km of a mine (treated) to those 80–150 km away (control), before (2000–2003) and after the boom (2004–2015).[7] We begin by examining whether treated individuals are more likely to enter entrepreneurship and estimate the following specification:

$$Y_{ijt} = \alpha_i + \alpha_j + \alpha_t + \beta(Post_t \times Treated_{ijt}) + \lambda X_{it} + \epsilon_{ijt} \tag{1}$$

where Y_{ijt} is equal to 1 if individual i located in grid j in year t is an entrepreneur. We use a linear probability model to examine the binary outcome.[8] $Treated_{ijt}$ is a binary variable that takes the value of 1 if individuals are located within 80 km of the nearest mine and 0 if they reside between 80 and 150 km from the nearest mine (control). $Post_t$ is a binary indicator equal to 0 before the mining boom (2000-2003) and 1 after (2004-2015). The coefficient of interest is the β, which identifies the difference-in-differences estimate of the effects of the mining boom on the outcome Y_{ijt}. To control for omitted variables and isolate the effect of the event, we include α_i, α_j, and α_t, which are individual, grid, and time fixed effects, respectively. The vector X_{it} contains time-varying controls for being married, having children under 18, education categories (primary, secondary, and tertiary), and economic sector, which distinguishes between non-employed, primary (extraction and agriculture), secondary (manufacturing and construction), and tertiary (services, healthcare, public sector, and other).

In the second part of the analysis, we focus on the performance of existing entrepreneurs. The specification in this case is similar to equation (1), but is represented more formally as equation (2). The population sample in this analysis consists of existing entrepreneurs, defined as those who had been entrepreneurs for at least 2 years before the mining boom. We estimate the following specification:

$$W_{ijt} = \alpha_i + \alpha_j + \alpha_t + \beta(Post_t \times Treated_{ijt}) + \epsilon_{ijt} \tag{2}$$

where W_{ijt} corresponds to a continuous variable measuring the income of entrepreneurs or a binary variable measuring the exit from entrepreneurship. As described in Section 2, we rely on three different measures of income: disposable, labor (earnings), and capital income. The estimation includes the same fixed effects (α_i, α_j, and α_t) as equation (1). The variable of interest, β, which is the interaction between the timing of the shock and the treated dummy, allows us to understand whether the performance of entrepreneurs is affected by the shock.

We complement these baseline estimations (equations 1 and 2) by examining heterogeneity across specific population groups (e.g., gender, age, education, or income). To do so, we rely

[7] It is worth noting that in 2004, Statistics Sweden changed the routines for collecting information and expanded the definition of business owners to also include those reporting zero profits or losses. However, since this change affected everyone, it does not threaten our identification strategy. A definition change affects the reported level of entrepreneurship but not the relative differences between treated and control areas, which is what the DID relies on.

[8] While logit and probit models are also used for binary outcomes, they add their own assumptions, often don't have closed-form solutions, and their interpretation is more complex (Huntington-Klein, 2021).

on the same estimations as above, but divide the sample accordingly.

Last, to get a better understanding of how entrepreneurs react to local economic shocks, we estimate the DID specifications from the firms' side. We therefore identify firms owned by the entrepreneurs described above. The unit of observation now is the firm rather than individuals, and the estimation is presented in equation (3):

$$Z_{fjt} = \alpha_f + \alpha_j + \alpha_t + \beta(Post_t \times Treated_{fjt}) + \epsilon_{fjt} \tag{3}$$

where Z_{fjt} denotes firm performance, measured by value added per employee, wage costs per employee, employment, and operating profit for firm f located in grid j in year t. $Treated_{fjt}$ is 1 if the firm is owned by an entrepreneur located within 80 km of the nearest mine (treated) and 0 if located between 80 and 150 km away (control). As before, $Post_t$ is equal to 0 before the mining boom (2000-2003) and 1 after the boom (2004-2015). In all estimations, we cluster standard errors at the grid level, allowing for an arbitrary covariance structure over time within each grid, and account for the serial correlation in the error term (Bertrand et al., 2004; Miller, 2023).

2.3.1 Identifying assumptions

The key identifying assumption behind DID is that, in the absence of the mining boom, entry to entrepreneurship and performance of entrepreneurs among treated individuals would have followed the same trend as among control individuals (Meyer, 1995). A violation of this assumption would imply that the observed effects might be a result of preexisting trends instead of the boom. Online Appendix Figure B.3 descriptively shows entrepreneurship rates in the treated and control areas before and after the shock. While we observe some differences in levels (also shown in Table 1), what is important for identification is that there are no differences in trends. Visually, the figure indicates no systematic differences in the pre-boom time trends across groups. To empirically assess the validity of the "parallel trends" assumption, we estimate the following dynamic DID equation:

$$Y_{ijt} = \alpha_i + \alpha_j + \alpha_t + \sum_{t}^{T} \beta_t \times I_t \times Treated_{ijt} + \epsilon_{ijt} \tag{4}$$

where Y_{ijt} is equal to 1 if individual i located in grid j in year t is an entrepreneur. $Treated_{ijt}$ is a binary variable that takes the value of 1 if individuals are located within 80 km of the nearest mine and 0 if they reside between 80 and 150 km (control). The I_t's represent each year, accounting for the dynamic nature of the approach. The coefficients of interest are the β_{jt}s, which identify the per-period difference-in-differences estimate of the effects of mining on the outcome Y_{ijt}. We normalize β_{2003} to zero; thus, all the coefficients are interpreted as changes relative to that year. In the DID approach, the first difference is between the reference period $t = 2003$ and the period $t + x$, and the second difference is between the treated and control individuals. The β_ts for $t > 2003$ capture the dynamic effects of the treatment. On the other hand, the β_ts for $t \leq 2003$ provide a placebo or falsification test for the parallel trend assumption. Analyzing the individual significance of the pretreatment coefficients is the most common formal criterion for evaluating pre-trends (Roth, 2022). In addition, we perform a joint significant test of the pretreatment coefficients in all specifications, which is included at the bottom of the results tables.

The second assumption is that there are no time-varying omitted variables at the treatment level correlated with the shock intensity and the outcomes. In our case, the approach assumes that individuals in treated and control locations are similar (Von der Goltz and Barnwal, 2019). The fact that there is little to no change in the results when including the control variables supports this assumption. In addition, Online Appendix Table A.1 shows the changes in individual characteristics between 2000 and 2003 for treated individuals compared with control individuals and the mean difference test. We do not find any economically meaningful differences in trends across groups, and only a few characteristics have p-values less than 0.05. An additional concern is endogenous self-selection, where individuals may have chosen to move closer to the mines, anticipating that the move would improve their living conditions and prospects for becoming entrepreneurs. To address this concern, our main specification excludes individuals who moved to the treated or control location after 2004 (Benshaul-Tolonen et al., 2019; Jacobsen et al., 2023).

3 Results and analysis

Results are presented in four sections. First, we analyze whether individuals living near the mines were more likely to enter entrepreneurship (extensive margin). Second, we examine the shock's effect on the performance of existing entrepreneurs (intensive margin). Third, we examine how the shock affected the performance of firms owned by these entrepreneurs. Finally, robustness checks are performed to validate the main results. All estimations include individual, year, and grid fixed effects unless otherwise noted, and standard errors (in parentheses) are clustered at the grid level.

3.1 Entry into entrepreneurship

Table 2 reports the DID coefficients estimated from equation (1) using the binary outcome of being an entrepreneur as the dependent variable. Column (1) does not include control variables and is our preferred specification since some controls could be endogenous to the mining boom (Allcott and Keniston, 2018). To evaluate the robustness of the results, in column (2) we present the results with controls, and column (3) excludes individual fixed effects. Column (4) fixes treatment status based on residence in 2003 to limit movement across groups. Last, in column (5), we estimate the results by also including migrants. For all specifications, we report the p-value from a formal test for the presence of pre-trends. In the next section, we complement these tests with event study graphs.

The results suggest a positive and significant increase in the probability of being an entrepreneur after the mining boom for those individuals living near the mines. In our preferred specification in column (1), estimates show a 0.6 percentage point increase in the probability of being an entrepreneur among treated individuals relative to their non-treated counterparts, which translates to a 40% increase relative to the pre-shock mean. This effect remains robust to the different specifications in columns (2)-(5).

Table 2: Impact of the mining boom on entrepreneurship, 2000-2015

	(1)	(2)	(3)	(4)	(5)
	Residents	Residents	Residents	Residents (distance 2003)	Residents and migrants
Post*Treated	0.006***	0.006***	0.005***	0.006***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Controls	No	Yes	No	No	No
Individual FE	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes	Yes
Nxt	523436	523436	523436	467765	566165
N	32715	32715	32715	29235	35385
Mean dep. var (2000-03)	0.015	0.015	0.015	0.015	0.015
Pre-trends (p-value)	0.327	0.389	0.604	0.319	0.262
R-squared	0.620	0.621	0.061	0.624	0.618
Within R-squared	0.000	0.002	0.000	0.000	0.000

Notes: Two-way fixed effects panel regression. Treated: $\leq 80km$, control: 80-150 km. Controls include marital status, having children under 18, educational levels, and economic sectors. Standard errors (in parentheses) clustered at the grid level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

These findings align with previous studies, suggesting that positive economic shocks can create new entrepreneurial opportunities. For example, Svaleryd (2015) affirms that favorable economic conditions in Sweden correlate with increased new firm formation. In addition, Decker et al. (2024) documents that a shale oil and gas boom in the US increased net new establishments and new firms. This pattern also complements prior research, which shows that resource-driven booms improve local economic activity, including increased employment opportunities and rising incomes (Black et al., 2005; Allcott and Keniston, 2018; Feyrer et al., 2017; Rodríguez-Puello and Rickardsson, 2024). The increase in entrepreneurship can thus be seen as part of a broader labor market adjustment to favorable economic shocks. Moreover, it is also important to point out that the observed increase among the treated is not driven by a relative decline in entrepreneurship in the control group. Online Appendix Figure B.3 shows that entrepreneurship rises in both groups, but the increase is steeper for the treated.

A growing body of literature shows that mining booms often attract individuals looking for better labor market opportunities (Komarek, 2016; Wilson, 2022). This is important to consider, because the benefits of positive economic shocks may be exploited by migrants rather than residents (Guettabi and James, 2020; Winters et al., 2021; Wilson, 2022). For example, Liu et al. (2024) finds in China that fewer barriers to migration translate into sizable increases in entrepreneurial activities. From a welfare perspective, it does not matter who responds to the shock, as total welfare can still increase. From a local development perspective, however, identifying who benefits helps us understand who responds to local shocks and how. While our main specification in Table 2 estimates the effect on entry to entrepreneurship on residents, Table 3 below shows the effects of the mining boom on the entry into entrepreneurship of migrants. In this case, the treatment variable equals one when the individual migrates to within 80 kilometers of the nearest mine in any year following the mining boom, and two if the individual migrates to a location 80 to 150 kilometers from the nearest mine. The reference category is the migrants before the migration event. Therefore, we show the combined effect of both events on entrepreneurship: migration and the mining boom. The results suggest that the mining boom does not significantly impact the probability of migrants entering entrepreneurship. Instead, as shown in Rodríguez-Puello and Rickardsson (2024), migrants to the mining area obtain benefits from the mining boom through higher earnings and more employment opportunities.

Table 3: Impact of the mining boom on entrepreneurship of in-migrants, 2000-2015

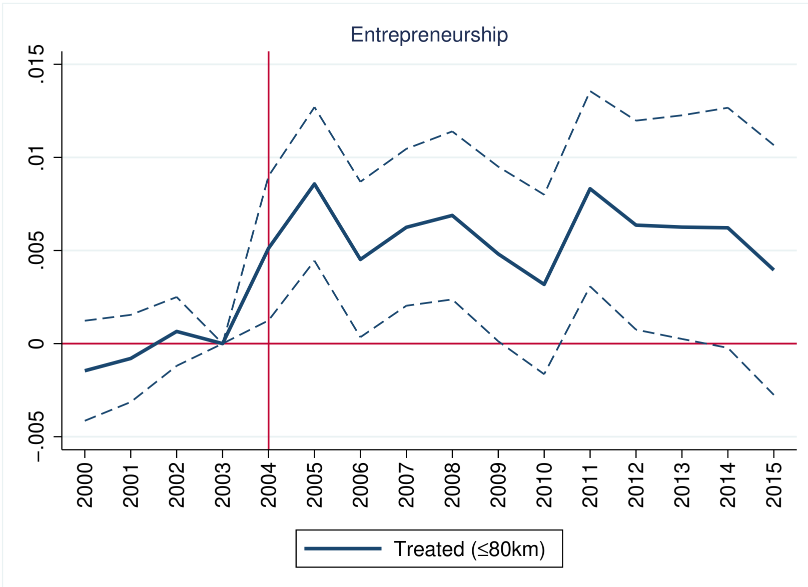
	(1)	(2)	(3)
Post*Treated (≤80km)	0.003	0.002	0.002
	(0.003)	(0.003)	(0.003)
Post*Treated (80-150km)	0.001	-0.007	-0.007
	(0.005)	(0.005)	(0.005)
Controls	No	No	Yes
Individual FE	No	Yes	Yes
Year FE	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes
Nxt	135396	135396	135396
N	8462	8462	8462
Mean dep. var (2000-03)	0.007	0.007	0.007
Pre-trends (p-value)	0.524	0.765	0.777
R-squared	0.269	0.551	0.551
Within R-squared	0.000	0.000	0.002

Notes: Two-way fixed effects panel regression. Treated: $\leq 80km$, control: 80-150 km. Controls include marital status, having children under 18, educational levels, and economic sectors. Standard errors (in parentheses) clustered at the grid level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

3.1.1 Development over time

To validate the parallel trends assumption and analyze the temporal dynamics of entry into entrepreneurship after the mining boom, we estimate equation (4). Figure 2 shows the dynamic treatment effect computed using the same specification of column 1 in Table 2. The figure shows the effect of the mining boom on the probability of being an entrepreneur by year for the whole period. The coefficients identify the differential local dynamic impact of the economic shock on individuals within 80 km of the mines compared with those between 80 km and 150 km. The coefficients for years 2000-2002 (before the shock) allow us to test the presence of parallel pre-trends. They are not significantly different from zero, indicating that the treated and control individuals followed similar trajectories before the boom. Thus, they provide support for the use of a difference-in-differences empirical strategy.

Figure 2: Event study of the impact of the mining boom on entering entrepreneurship



Notes: Year 2003 is the reference. 95% confidence interval shown. Estimations include individuals, grid, and time fixed effects. The sample excludes the migrants to the mining area. Standard errors are clustered at the grid level.

After 2004, we observe an increase in the probability of entering entrepreneurship among individuals in the treatment group compared to those in the control. The results indicate that between 2004 and 2008, individuals residing close to the mines were significantly more likely to transition into entrepreneurship. Interestingly, the increase in entrepreneurship appears immediately, suggesting that individuals responded quickly to the boom. In Sweden, starting a firm is a relatively straightforward process, with registration typically taking only a few weeks and modest start-up capital requirements that apply equally to both treated and control areas. The direct response is therefore not necessarily surprising.

This effect diminished in 2009 and 2010, becoming statistically insignificant, which coincides with the timing of the global financial crisis. Between 2011 and 2013, we again observe an increase in entrepreneurial activity, suggesting a renewed response to economic conditions. However, this effect fades and becomes statistically insignificant in the years that follow. These findings complement the ones in Table 2 showing lasting positive effects of the boom on entrepreneurship.

3.1.2 Treatment effect heterogeneity

While treated individuals were more likely to enter entrepreneurship after the boom, the effect might mask heterogeneity between different groups. We therefore estimate the specification in equation (1) separately by gender, age groups, education level, income, and economic sectors (Tables 4 and 5).[9]

Results in Table 4 show that both men and women in treated areas are more likely to enter entrepreneurship after the shock. However, the effect size is larger for women relative to the pre-shock mean. While this may seem surprising at first, since mining is a male-dominated industry, the opportunity cost of entering entrepreneurship is higher for men. For women, employment opportunities may not have changed to the same extent, lowering the opportunity cost of starting a business in comparison. In addition, higher household income through partners working in mining or related sectors could have also provided the financial room to pursue entrepreneurship. Another reason can be that the increase in entrepreneurship isn't necessarily driven by entrepreneurship in mining but also in other sectors.

Table 4: Impact of the mining boom on entrepreneurship by demographic groups, 2000-2015

	(1) Male	(2) Female	(3) Age 18-30	(4) Age 31-50	(5) Age 51-65	(6) Primary education	(7) Secondary education	(8) Tertiary education	(9) High income	(10) Low income
Post*Treated	0.007**	0.006***	0.003	0.007**	0.002	0.006**	0.008**	0.007	0.005	0.007***
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nxt	281110	242326	95213	219578	208645	276653	148683	41916	257754	210011
N	17569	15145	5951	13724	13040	17291	9293	2620	16110	13126
Mean dep. var (2000-03)	0.021	0.009	0.004	0.019	0.015	0.017	0.014	0.009	0.021	0.010
Pre-trends (p-value)	0.245	0.833	0.859	0.280	0.818	0.318	0.109	0.290	0.013	0.994
R-squared	0.640	0.563	0.492	0.655	0.751	0.650	0.596	0.593	0.674	0.522
Within R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Two-way fixed effects panel data regression. Treated: $\leq 80km$, control: 80-150 km. Individuals who earn above the median in 2003 are classified as high income; otherwise, they are classified as low income. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Moreover, columns (3) - (5) show that the effects of the mining boom on entrepreneurship are concentrated among prime-working-age individuals, between 31 and 50 years old. Columns (6) - (8) report heterogeneity by education. Treated individuals with primary and secondary

[9] To avoid endogenous movement across categories, individuals are classified in their education level, income bracket, and industry according to their information in 2003. Individuals who earn above the median in 2003 are classified as high income; otherwise, they are classified as low income.

education are more likely to enter entrepreneurship due to the mining boom, compared with individuals in the control area. This result aligns with previous literature, which suggests that education has no impact on selection into entrepreneurship, but it positively affects its performance (Van der Sluis et al., 2008). Moreover, the mining sector is composed primarily of low- or medium-low-skilled workers (Pérez and Rodríguez-Puello, 2022), therefore, this group observes higher improvements in their labor market conditions from the shock (Rodríguez-Puello and Rickardsson, 2024). The size of the coefficient estimates is similar for those individuals with tertiary education; nevertheless, it is not statistically significant, which might be due to the lower sample size. Last, columns (9) and (10) show that the increase in entrepreneurship is driven by low-income individuals. This pattern is in line with the education results, given the correlation between income and schooling. At the same time, it is also consistent with the mechanism that a mining boom that increases income (Rodríguez-Puello and Rickardsson, 2024), relaxes liquidity constraints, and covers start-up and operating costs of running a business.

In Table 5, we present results on sectoral heterogeneity, where we classify sectors into mining, agricultural, manufacturing, construction, services, public (including healthcare), and other sectors. This allows us to assess whether the effects on entrepreneurial activity are limited to sectors related to mining extraction or whether these effects are also experienced in other sectors (Feyrer et al., 2017).

Table 5: Impact of the mining boom on entrepreneurship by economic sector, 2000-2015

	(1) Mining	(2) Agriculture	(3) Manufacturing	(4) Construction	(5) Services	(6) Public	(7) Other
Post*Treated	0.002***	0.015	0.035***	0.037**	0.004	0.003***	0.008
	(0.001)	(0.020)	(0.011)	(0.015)	(0.007)	(0.001)	(0.009)
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nxt	42059	8833	32363	23092	97889	138566	13228
N	2629	552	2023	1443	6118	8660	827
Mean dep. var (2000-03)	0.001	0.036	0.038	0.048	0.040	0.002	0.002
Pre-trends (p-value)	0.707	0.917	0.816	0.651	0.011	0.515	0.445
R-squared	0.420	0.650	0.651	0.691	0.663	0.476	0.512
Within R-squared	0.000	0.000	0.003	0.002	0.000	0.000	0.000

Notes: Two-way fixed effects panel data regression. Treated: $\leq 80km$, control: 80-150 km. Sectors are classified into mining, agricultural, manufacturing, construction, services, public (including healthcare), and others. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Results indicate that the mining boom primarily increased the probability of becoming an entrepreneur in the mining, manufacturing, construction, and public sectors. Entrepreneurship in the agricultural, service, and other sectors is not affected differently in the treated and control areas. The significant increase in entrepreneurship in the mining sector is contrary to what Coelli and Pelzl (2025) finds in terms of innovation during stages of business cycles in the oil and gas sector. The authors find that innovation in oil and gas (the sector closest to the boom) is countercyclical, consistent with higher opportunity costs of innovation during booms. The results for the manufacturing and construction sectors align with previous studies that find evidence of positive local spillover effects from resource development on labor market conditions of workers, particularly in industries directly related to the resource sector (Tano et al., 2016; Feyrer et al., 2017; Allcott and Keniston, 2018). However, in contrast to the local multiplier literature (e.g., Moretti, 2010), we find no effect of the mining boom on entrepreneurship in the service sector. A likely explanation is that the jobs created were not high-skilled, so any increase in demand for local services was modest.

3.1.3 New establishments

While we observe that more people are becoming entrepreneurs in treated areas following the boom, we also examine whether this reflects the creation of new establishments and firms. As we can not observe the establishments/firms before they open, we cannot run a DID estimation on micro-level data. Instead, we aggregate the data to the neighborhood level and analyze the effect of the mining boom on the share of new establishments and firms. Results are reported in Table 6 as well as by economic sector in Online Appendix Table A.2.[10]

While the results are not very precise due to the small sample size (a consequence of the low population density in the north of Sweden), we do not observe an increase in the share of new establishments or new firms in treated neighborhoods after the mining boom compared to the control neighborhoods. At first glance, this appears inconsistent with the observed rise in the share of entrepreneurs. However, additional evidence from Online Appendix Figure B.4 shows that the vast majority of firms owned by these new entrepreneurs were opened before the mining boom.

[10]We measure neighborhoods using DeSO (Demografiska statistikområden) areas, small statistical units that usually contain between 700 and 2,700 residents, defined from SCB. They are delineated based on natural and geographic features such as streets, rivers, and railways. We estimate the following DID specification:

$$S_{dt} = \alpha_d + \alpha_t + \beta(Post_t \times Treated_{dt}) + \epsilon_{dt} \tag{5}$$

S_{dt} is the share of new establishments or new firms in DeSO d in year t. $Treated_{dt}$ equals 1 if the neighborhood lies within 80 km of a mine, and 0 if it is 80–150 km away. $Post_t$ is 0 before the mining boom (2000-2003) and 1 after (2004-2015). The coefficient of interest, β, identifies the interaction between the time dummy and treated dummy. We include neighborhood and time fixed effects (α_d and α_t) and cluster the standard errors at the neighborhood level.

Table 6: Impact of the mining boom on share of new establishments and firms, 2000-2015

	New establishments			New firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Post*Treated	0.001	-0.001	-0.003	0.012	0.009	0.007
	(0.014)	(0.013)	(0.013)	(0.015)	(0.015)	(0.015)
Controls	No	No	Yes	No	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
DeSO FE	Yes	No	Yes	Yes	No	Yes
Nxt	647	647	647	647	647	647
N	40	40	40	40	40	40
Mean dep. var (2000-03)	0.134	0.134	0.134	0.154	0.154	0.154
Pre-trends (p-value)	0.147	0.242	0.156	0.196	0.290	0.202
R-squared	0.365	0.106	0.375	0.309	0.096	0.319
Within R-squared	0.000	0.022	0.016	0.002	0.007	0.016

Notes: Two-way fixed effects panel regression. Treated: $\leq 80km$, control: 80-150 km. Controls include neighborhood employment share, education shares (primary, secondary; ref. = tertiary), share of men, and average age. Standard errors (in parentheses) are clustered at the DeSO level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

One explanation for this result can be hybrid entrepreneurship. According to SCB, entrepreneurs are defined based on their primary source of income, meaning that individuals are classified as entrepreneurs if most of their income comes from business activity rather than wage employment. In our context, this implies that many people who became entrepreneurs after the boom had been hybrid entrepreneurs, i.e., individuals who had combined wage employment with running an existing business before the boom (Folta et al., 2010). Following the boom, these individuals would have then shifted their primary income source from wages to income from the firm. We further analyze this possibility in Table 7. First, we re-estimate equation (1) by excluding all individuals who were hybrid entrepreneurs at any point in time before the boom from the sample. This is shown in Columns (1) and (2). In line with the hybrid entrepreneurship interpretation, the estimated effect is smaller and less precisely estimated. By contrast, when we count hybrid entrepreneurs together with full entrepreneurs in the outcome (columns 3–4), the estimated effect increases and becomes highly significant.

Table 7: Impact of the mining boom on entrepreneurship, excluding and including hybrid entrepreneurs, 2000-2015

	Hybrids excluded		Hybrids included	
	Residents	Residents and migrants	Residents	Residents and migrants
Post*Treated	0.003*	0.004**	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes
Nxt	519039	561693	523436	566165
N	32440	35106	32715	35385
Mean dep. var (2000-03)	0.010	0.010	0.017	0.017
Pre-trends (p-value)	0.672	0.768	0.668	0.757
R-squared	0.603	0.601	0.618	0.615
Within R-squared	0.000	0.000	0.000	0.000

Notes: Two-way fixed effects regression. Treated: $\leq 80km$, control: 80-150 km. In columns (1) and (2), pre-boom hybrid entrepreneurs. In columns (3) and (4), both hybrid and non-hybrid entrepreneurs are classified as entrepreneurs. Standard errors (in parentheses) clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Taken together, these results suggest that the creation of new firms did not entirely drive the increase in entrepreneurship in the treated area. Instead, individuals who were running a business at the same time as having a wage employment put more time/effort into their existing ventures after the boom. For hybrid entrepreneurs, the opportunity cost of moving into entrepreneurship was relatively low, as they already owned a firm and had knowledge of local market conditions, suppliers, and sector-specific demand. This pattern is consistent with positive demand spillovers being a dominant mechanism in how individuals respond to entrepreneurship, encouraging latent entrepreneurs, for whom the opportunity cost is the lowest, to focus primarily on their businesses. An alternative explanation is that existing ventures became more profitable, such that business income exceeded wage earnings. Since we do not have data on time allocation, we cannot separate these mechanisms, as they both are consistent with the observed patterns. However, the immediate response of entrepreneurship in the first treatment year (Figure 2) suggests that increased effort by hybrid entrepreneurs is a particularly plausible channel. While the straightforward process of establishing a firm in Sweden may have facilitated rapid entry, the quick response is also likely explained by hybrid entrepreneurs reallocating effort to their existing businesses without delay.

The transition matrices in Online Appendix Table A.3 reinforce this interpretation.[11]

[11] Each transition matrix reports the distribution of individuals' main occupational status in the post-boom period, conditional on their status in 2003. Rows sum to 100 and show the percentage of individuals in a given baseline category who are observed in each destination category after the boom. We only consider the first transition made by each individual. The classification of employment and entrepreneurship follows SCB,

Among treated individuals who were hybrid entrepreneurs in 2003, one-quarter transitioned to full-time entrepreneurship after the boom, by far the highest conversion rate into entrepreneurship across all pre-boom occupational categories. In contrast, only about 2% of individuals employed in other sectors made this transition. This disproportionate shift from hybrid to full entrepreneurship suggests that the observed increase in entrepreneurial activity was largely driven by existing business owners intensifying their engagement, rather than by wage workers launching entirely new ventures.

3.2 Entrepreneurs' Performance

In the first part of the analysis, we showed that individuals in treated areas were more likely to enter entrepreneurship after the boom. While this captures responses at the extensive margin, we do not know what happens with the incumbent entrepreneurs and their performance when they are affected by the shock. Existing literature has documented the short- and long-term effects of mining booms on earnings (Tano et al., 2016; Jacobsen et al., 2023; Rodríguez-Puello and Rickardsson, 2024), while focusing primarily on salaried employees. We complement that literature by focusing on the intensive margins and analyzing how the boom affected the performance of incumbent entrepreneurs, who we define as individuals who had been entrepreneurs for at least two years before the shock. Table 8 reports the estimated coefficients from equation (2). Column (1) presents effects for yearly disposable income, column (2) for yearly labor earnings, column (3) for yearly capital income, and column (4) for the likelihood of exiting entrepreneurship.

Results show a significant positive increase in disposable income of 56,596 SEK for treated entrepreneurs after the mining boom compared with control entrepreneurs, corresponding to a 31% increase relative to the pre-boom mean. Moreover, Rodríguez-Puello and Rickardsson (2024) observes increases in labor income and employment. To understand which dimension of disposable income the gain comes from, we examine the effects on labor and capital income. Differentiating between labor and capital income helps clarify the source of these gains: while labor income captures returns to own work effort, capital income reflects profits and asset returns from business ownership. The effect is concentrated in capital income, which rises by 46,368 SEK on average, while no significant change is observed in labor income. These patterns suggest that entrepreneurs are more likely to extract income through dividends rather than wages, reflecting the more favorable tax treatment of dividends (up to a threshold) under Swedish tax law. This incentive was further reinforced by the 2006 reform of the 3:12 rules, which reduced dividend tax rates and expanded allowances (Selin, 2021), encouraging

which defines entrepreneurs as individuals whose primary source of income comes from self-employment. We additionally distinguish a category of hybrid entrepreneurs, defined as individuals who combine wage employment with running a registered firm, but whose main source of income in 2003 comes from wages. These individuals are thus not counted as entrepreneurs in the baseline year, but can transition into full-time entrepreneurship if their income composition changes following the boom.

entrepreneurs to keep withdrawing profits via dividends rather than salaries. Finally, in column (4), we observe that the shock reduces the probability of exit from entrepreneurship for treated individuals relative to control individuals during the boom period. This indicates that the economic opportunities generated by the boom make continuing business operations more attractive.

Table 8: Impact of the mining boom on economic outcomes of entrepreneurs, 2000-2015

	(1) Disposable income	(2) Labor earnings	(3) Capital income	(4) Exit
Post*Treated	56.596***	14.990	46.368***	-0.101***
	(10.346)	(9.150)	(8.769)	(0.037)
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes
Nxt	7632	7632	7632	3220
N	477	477	477	201
Mean dep. var (2000-03)	179.593	197.995	8.178	0.078
Pre-trends (p-value)	0.266	0.816	0.624	0.168
R-squared	0.355	0.676	0.232	0.287
Within R-squared	0.003	0.002	0.002	0.004

Notes: Two-way fixed effects regression. All income variables are yearly and measured in 1000SEK. Treated: $\leq 80km$, control: 80-150 km. Standard errors (in parentheses) clustered at the grid level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Online Appendix Figure B.5 validates the parallel trends assumption for these outcomes and shows their temporal dynamics before and after the mining boom. Pre-treatment coefficients are close to zero and statistically insignificant, indicating no systematic differences in trends before the shock. Table A.4 shows the results separately by gender, age groups, education level, and income level. It is important to note the low number of observations in these results, which might affect the precision of the estimations. Results show an increase in disposable and capital income for both men and women. However, while male entrepreneurs focus more on increasing their capital income, female entrepreneurs see an increase in both labor and capital income. Moreover, the reduction in the probability of exiting entrepreneurship is concentrated among men. Regarding the effects by age groups (columns (3)-(5)), the positive effects of the mining boom on the performance of existing entrepreneurs are concentrated among individuals between 31 and 65 years old, with no significant impacts among younger individuals. Columns (6)-(8) focus on the effects for primary, secondary, and tertiary educational levels. While treated entrepreneurs with all educational levels observe an increase in their disposable and capital income, labor income only increases for those with primary education. The reduction in the probability of exiting entrepreneurship is concentrated among treated individuals with primary education. Last, columns (9) and (10) focus on the effects by income levels, showing that the positive effects are concentrated among individuals with high pre-treatment income levels.

3.3 Firm performance

We have established that the treated entrepreneurs benefit from the mining boom in terms of income. To better understand how firms perform, we now turn to the performance of their firms. Table 9 presents the results from equation (3) for four firm-level outcomes: employment, value added per employee, wage costs per employee, and operating profit. To check the identifying assumptions, we estimate an event study with results shown in Online Appendix Figure B.6. The figure shows that firms owned by treated and control entrepreneurs are on parallel trends before the mining boom.

Results show that firms owned by treated entrepreneurs experienced significant increases in employment and wage costs compared to the control group. The increase in average wage costs of 23,743 SEK aligns with Rodríguez-Puello and Rickardsson (2024), who find that individuals living near the mines earned between 22,000–28,000 SEK more per year because of the boom. However, value-added per employee, which is a proxy for productivity, and operating profit are not statistically different for treated and control groups after the mining boom. The evidence suggests two opposing mechanisms: stronger local demand on the one hand, and higher wage costs from improved market conditions on the other. These appear to balance out, as the effect on operating profits is statistically insignificant. Since we do not observe an increase in the number of new firms as shown in 3.1.3, competition effects are unlikely to explain the results.

Table 9: Impact of the mining boom on performance of entrepreneurs' firms, 2000-2015

	(1) Employment	(2) Value added per employee	(3) Wage costs per employee	(4) Asinh(operating profit)
Post*Treated	2.397**	50.056	23.743**	0.222
	(1.046)	(33.473)	(10.836)	(0.146)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes
Nxt	4453	4303	4303	3479
N	278	269	269	217
Mean dep. var (2000-03)	22.078	416.726	212.691	5.925
Pre-trends (p-value)	0.854	0.682	0.518	0.235
R-squared	0.998	0.498	0.448	0.787
Within R-squared	0.000	0.001	0.002	0.002

Notes: Two-way fixed effects panel data regression. Treated: $\leq 80km$, control: 80-150 km. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Due to the low number of observations, we do not have enough power to estimate the heterogeneity analyses as in detail as we do in the earlier analyses. However, we analyze heterogeneity by firms' age and firm size to better understand which firms are driving the results (Online Appendix Table A.5). We classify firms as young if they are at most five years old in a given year, and as big if they had more than the sample median of four employees in 2003. The increase in the number of employees and performance is concentrated among old and big firms.

3.4 Robustness checks

The estimated impacts of the mining boom on entry into entrepreneurship and performance of existing entrepreneurs are robust to a variety of alternative specifications and robustness checks. Results are shown in Online Appendix Tables A.6 and A.7 and are estimated only for residents and not migrants. Column (1) in each table reports the results from the baseline specification for reference. In Column (2), we restrict the sample to individuals under 55 years old, which corresponds to the "prime" working years. We do this to make sure the results are based on exogenous changes in economic opportunities and not on endogenous household-level choices related to retirement (Jacobsen et al., 2023). This change has little effect on the coefficient estimates. In Column (3), we change the clustering method from grid-level clustering to two-way clustering by both grid and year, following (Feyrer et al., 2017). This approach allows us to account for spatial correlation within a period using the year clustering and to account for correlation over time within a geographic group using the geographic clustering (Cameron et al., 2011). The results remain robust. In Column (4), we restrict the sample to employed individuals in any year to make the control group more similar to the treated group. The results remain robust to this change. In column (5), we exclude public sector workers because their labor market conditions might react differently to those in other sectors (Katovich et al., 2025). The public sector in Sweden is characterized by job stability and a different wage-setting system. The results remain robust to this change. In Column (6), we restrict the sample to a balanced panel to improve the stability across time in the sample size and follow individuals throughout the whole period. The results are robust to this restriction. Finally, in Column (7), the binary indicator that reflects the boom is interacted with the treated indicator in the DID approach is replaced by a continuous measure of the international price of iron ore ($Log(price)$). This variable follows closely the evolution over time of the exogenous world price of iron ore. This change has little effect on the conclusions drawn in the main specifications.

Throughout the paper, we define entrepreneurs as individuals whose primary source of income comes from owning a limited company (incorporated entrepreneurship); these results are reported in column (1) of Online Appendix Table A.8. As a robustness check, we re-estimate column (1) using two alternative definitions. Column (2) adopts a broader definition that includes both incorporated and unincorporated entrepreneurs, while column (3) restricts the sample to unincorporated entrepreneurs only. When unincorporated entrepreneurs are considered, the sign of the coefficient reverses, indicating a decline in this specific type of entrepreneurship due to the mining boom. This is further shown when focusing solely on unincorporated entrepreneurship (column 3). The negative effect is even larger in magnitude, suggesting that the positive baseline result is entirely attributable to gains in incorporated businesses. These patterns are consistent with the idea that the boom shifted entrepreneurial activity toward more formal and capital-intensive ventures, while discouraging informal or small-scale entrepreneurship. The decline in unincorporated entrepreneurship likely reflects the reallocation of labor toward better-paid wage employment opportunities generated by the boom or incorporated entrepreneurship. This pattern is also consistent with the idea that positive local shocks can crowd out marginal or necessity-driven entrepreneurship, while fostering more formal and capital-intensive business activity.

We conduct a similar exercise for the performance of incumbents. In the main analysis (Tables 8 and 9), entrepreneurs are defined as individuals who have owned a limited liability company for at least two years before the boom. We replicate the analysis when the definition of entrepreneurs is changed to those whose main source of income comes from owning unincorporated firms. Results under this definition are reported in Online Appendix Tables A.9 and A.10, for individuals and their firms. We observe positive effects during the boom on disposable, labor, and capital income, while the probability of exit is statistically insignificant. In addition, treated firms are more likely to report higher profits. Thus, the positive effects on incumbents also extended to unincorporated firms in treated areas.

Next, to ensure that the choice of the cutoff does not drive the results, we re-estimate our models using alternative distance cutoffs to define the treated area, while keeping the control group fixed. Online Appendix Figure B.7 shows the sensitivity results for the effect of the mining boom on the probability of being an entrepreneur. Online Appendix Figures B.8 and B.9 show the sensitivity results for the entrepreneurs' and firms' performance, respectively. The results are stable, and we choose 80 km as our preferred specification to avoid including less-treated individuals in the control group.

As an alternative to defining treated individuals based on geographical distance (within 80 km of the nearest mine), we also redefined treatment using travel time by car, measured with OpenStreetMap data using the Open Source Routing Machine (OSRM). On average, individuals located 80 km from a mine face a travel time to the mines of about 120 minutes. We therefore classify as treated those residing within 120 minutes' driving time of the nearest mine. Online Appendix Table A.11 reports the results. The estimated effects for entry into entrepreneurship are virtually unchanged, confirming that the findings are robust to this alternative treatment definition.

4 Conclusion

We study how local economic shocks shape entrepreneurial dynamics by analyzing both entry into entrepreneurship (extensive margin) and the performance of existing entrepreneurs and firms (intensive margin). Our empirical setting exploits the 2004 mining boom in Sweden as a source of exogenous variation in local economic conditions. Using geocoded register employer–employee data from Statistics Sweden covering the years 2000 to 2015, we estimate difference-in-differences and event study models. We compare outcomes for individuals located within 80 km of a mine (treated group) to those located 80-150 km away (control group), before (2000-2003) and after (2004-2015) the boom.

First, we examine whether individuals in treated areas were more likely to enter entrepreneurship. We observe a 0.6 percentage point increase in the likelihood of entering entrepreneurship, corresponding to a 40% increase over the pre-treatment sample mean. This effect is driven by existing residents rather than in-migrants, individuals in their prime working age, with low education and income. Moreover, the results are concentrated in entrepreneurship in the mining, manufacturing, and construction sectors, which are related to the mining activity. Nevertheless, while we observe an increase in entrepreneurship, we do not observe a rise in new establishments or firms in treated areas. We explain this through the nature of the entrants: many were hybrid entrepreneurs, i.e., individuals who combined wage employment with business ownership before the boom. Since entrepreneurial status is defined through the primary income source, these individuals moved from relying mainly on wages to earning primarily from their businesses. This shift is suggestive of a reallocation of effort toward existing ventures rather than the creation of new firms.

Second, we examine how the mining boom affected incumbent entrepreneurs, defined as those who had been entrepreneurs for at least two years before the shock. Results show positive effects from the boom in terms of higher capital income, but not labor income. Since entrepreneurs have flexibility in how they compensate themselves, they may prefer dividends over wages, since they are taxed more favorably. Moreover, the mining boom reduces the probability of exiting entrepreneurship. Third, we examine the performance of firms owned by treated entrepreneurs. We find that they grow more than the control group, but their average labor costs also increase as they must offer higher wages in an improved local labor market. As a result, the gains in size are not reflected in higher operating profits for treated firms, where the estimated effects, relative to the control group, are statistically insignificant.

Taken together, these results provide insights into how local economic booms shape entrepreneurial activity. We find suggestive evidence that local resource booms can stimulate lasting, growth-oriented entrepreneurship, rather than merely generating temporary necessity-driven self-employment. Moreover, the analysis underscores the importance of studying individual-level responses to local shocks, since aggregate measures on regional levels do not capture different mechanisms at play.

These insights are relevant for both researchers and policymakers. Entrepreneurship plays a central role in economic development, and many policy initiatives around the world aim to foster new firm formation. Our results show that local economic booms can stimulate entrepreneurial activity, but that these effects may be concentrated in specific sectors, underscoring the importance of understanding the context-specific drivers of entrepreneurship. Moreover, the Swedish mining boom provides a particularly policy-relevant case. The mines are located in northern Sweden, a geographic area characterized by population decline and geographical separation from the rest of the country. As such, our findings contribute not only to academic debates on occupational choice and the impact of local shocks but also to ongoing discussions about how to promote economic revitalization in peripheral areas. Recognizing how temporary economic booms can create lasting entrepreneurial responses is important for designing effective, targeted interventions.

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Online Appendix

Local Economic Shocks and Entrepreneurship Dynamics

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December 8, 2025

A Appendix: Additional tables

Table A.1: Mean differences of changes (2000-2003) by treatment status

	Treated	Control
Entrepreneur	-0.00	-0.00
Distance to mine(km)	-0.32	1.63***
Married	0.00	-0.00
Children under 18	-0.03	-0.04**
Primary education	-0.03	-0.03
Secondary education	0.02	0.02*
Tertiary education	0.01	0.00***
Non-employed	0.00	0.01*
Primary sector	-0.01	-0.01
Secondary sector	0.00	0.00
Tertiary sector	0.00	-0.00

Notes: Each value represents a change between 2000 and 2003. Primary sectors include extraction and agriculture, secondary include manufacturing and construction, and tertiary include services, healthcare, the public sector, and others. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2: Impact of the mining boom on share of new establishments by sector, 2000-2015

	(1) Mining	(2) Agriculture	(3) Manufacturing	(4) Construction	(5) Services	(6) Public	(7) Other
Post*Treated	0.039	0.067	0.072*	0.001	-0.023	-0.020	-0.060*
	(0.027)	(0.051)	(0.043)	(0.030)	(0.021)	(0.029)	(0.036)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DeSO FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nxt	647	647	647	647	647	647	647
N	40	40	40	40	40	40	40
Mean dep. var (2000-03)	0.034	0.210	0.113	0.100	0.134	0.083	0.173
Pre-trends (p-value)	.	0.066	0.029	0.008	0.483	0.135	0.528
R-squared	0.080	0.196	0.141	0.138	0.186	0.173	0.182
Within R-squared	0.003	0.004	0.007	0.000	0.003	0.001	0.006

Notes: Two-way fixed effects regression. Treated: $\leq 80km$, control: 80-150 km. All the estimations include DeSO and time fixed effects. Standard errors (in parentheses) are clustered at the DeSO level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: Transition Matrix for treated and control: Before vs. After

↓ before / → after	Entrepreneur	Employed (other sec.)	Employed (mining sec.)	Employed (manuf. sec.)	Hybrid	Non-employed	Total
Panel A: Treated individuals in 2003							
Entrepreneur	50 (18.8)	101 (40.0)	3 (1.1)	12 (4.5)	61 (22.9)	39 (14.7)	266 (100)
Employed (other sec.)	333 (1.9)	11,103 (63.8)	959 (5.5)	888 (5.1)	276 (1.6)	3,829 (22.0)	17,388 (100)
Employed (mining sec.)	1 (0.0)	903 (31.5)	1,824 (63.6)	53 (1.8)	15 (0.5)	70 (2.4)	2,866 (100)
Employed (manuf. sec.)	41 (2.9)	891 (62.9)	148 (10.4)	240 (16.9)	19 (1.3)	77 (5.4)	1,416 (100)
Hybrid	20 (25.0)	40 (50.0)	3 (3.7)	4 (5.0)	10 (12.5)	3 (3.7)	80 (100)
Non-employed	70 (1.3)	1,560 (29.2)	39 (0.7)	95 (1.8)	2 (0.0)	3,574 (66.9)	5,340 (100)
Panel B: Control individuals in 2003							
Entrepreneur	36 (26.3)	45 (32.8)	0 (0.0)	21 (15.3)	16 (11.7)	19 (13.9)	137 (100)
Employed (other sec.)	116 (1.9)	3,742 (62.6)	87 (1.5)	306 (5.1)	84 (1.4)	1,643 (27.5)	5,978 (100)
Employed (mining sec.)	0 (0.0)	9 (36.0)	13 (52.0)	3 (12.0)	0 (0.0)	0 (0.0)	25 (100)
Employed (manuf. sec.)	17 (2.2)	472 (61.0)	16 (2.1)	214 (27.6)	5 (0.6)	50 (6.5)	774 (100)
Hybrid	13 (19.1)	35 (51.5)	0 (0.0)	8 (11.8)	11 (16.2)	1 (1.5)	68 (100)
Non-employed	18 (0.7)	707 (28.3)	0 (0.0)	52 (2.1)	2 (0.1)	1,715 (68.8)	2,494 (100)

Notes: Row percentages in parentheses. The table shows the transitions between different occupational categories between 2003 (before the shock) and the first transition after 2004.

Table A.4: Impact of the mining boom on economic outcomes of entrepreneurs by demographic groups, 2000-2015

	(1) Male	(2) Female	(3) Age 18-30	(4) Age 31-50	(5) Age 51-65	(6) Primary education	(7) Secondary education	(8) Tertiary education	(9) High income	(10) Low income
Panel A: Yearly disposable income (1000SEK)										
Post*Treated	56.934***	62.570***	11.513	60.354***	41.693***	58.577***	53.057***	95.779***	69.460***	9.779
	(12.776)	(13.122)	(16.721)	(19.086)	(12.537)	(14.452)	(16.366)	(30.855)	(12.917)	(12.726)
Mean dep. var (2000-03)	187.323	159.321	148.471	179.349	182.661	169.473	194.490	232.365	192.963	150.814
Pre-trends (p-value)	0.291	0.857	0.998	0.285	0.722	0.613	0.312	0.289	0.614	0.473
R-squared	0.353	0.369	0.826	0.372	0.399	0.406	0.295	0.264	0.328	0.428
Within R-squared	0.003	0.007	0.005	0.003	0.002	0.004	0.003	0.002	0.004	0.000
Panel B: Yearly labor earnings (1000SEK)										
Post*Treated	11.799	26.383*	-12.957	18.356*	-10.120	20.194**	6.744	59.757	28.388***	-20.978
	(10.379)	(15.253)	(61.677)	(11.114)	(15.134)	(10.178)	(18.785)	(42.960)	(9.934)	(16.968)
Mean dep. var (2000-03)	209.618	167.511	172.163	211.876	179.656	186.084	208.736	297.155	240.439	112.371
Pre-trends (p-value)	0.570	0.939	0.549	0.139	0.175	0.746	0.655	0.541	0.896	0.703
R-squared	0.670	0.690	0.746	0.714	0.748	0.685	0.623	0.723	0.578	0.627
Within R-squared	0.001	0.006	0.002	0.003	0.001	0.003	0.000	0.010	0.005	0.004
Panel C: Yearly capital income (1000SEK)										
Post*Treated	48.625***	42.933***	5.549	55.058***	37.203***	47.745***	48.074***	44.586**	57.377***	9.245
	(11.260)	(9.707)	(8.734)	(16.204)	(11.926)	(12.329)	(14.367)	(21.472)	(10.639)	(11.201)
Mean dep. var (2000-03)	8.983	6.068	-2.086	2.223	17.901	5.997	12.441	13.805	7.055	9.514
Pre-trends (p-value)	0.721	0.843	0.283	0.741	0.624	0.750	0.391	0.231	0.663	0.797
R-squared	0.236	0.279	0.520	0.280	0.247	0.283	0.183	0.213	0.229	0.274
Within R-squared	0.002	0.004	0.001	0.003	0.001	0.003	0.002	0.001	0.002	0.000
Panel D: Exit from entrepreneurship										
Post*Treated	-0.109***	-0.092	0.627	-0.082	-0.091	-0.086**	-0.135	-0.367	-0.073*	-0.123*
	(0.036)	(0.107)	(0.361)	(0.052)	(0.064)	(0.040)	(0.085)	(0.239)	(0.044)	(0.070)
Mean dep. var (2000-03)	0.071	0.096	0.042	0.054	0.113	0.073	0.094	0.047	0.042	0.135
Pre-trends (p-value)	0.391	0.242	0.442	0.214	0.703	0.087	0.362	0.191	0.016	0.943
R-squared	0.267	0.385	0.583	0.296	0.313	0.306	0.275	0.410	0.269	0.345
Within R-squared	0.005	0.003	0.155	0.003	0.002	0.003	0.005	0.044	0.002	0.005
Nxt	2453	767	57	1632	1531	2119	936	165	2236	984
N	153	48	4	102	96	132	58	10	140	62

Notes: Two-way fixed effects panel data regression. All estimations include individual, year, and grid fixed effects. Treated: $\leq 80km$, control: 80-150 km. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Impact of the mining boom on performance of entrepreneurs' firms by age and size of the firm, 2000-2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment		Value added per employee		Wage costs per employee		Asinh(operating profit)	
Panel A:	Young	Old	Young	Old	Young	Old	Young	Old
Post*Treated	0.063	3.101**	33.964	38.763	14.755	12.179	0.180	0.141
	(2.261)	(1.480)	(62.618)	(33.353)	(18.826)	(10.055)	(0.282)	(0.186)
Nxt	1676	2777	1562	2741	1562	2741	1271	2208
N	105	174	98	171	98	171	79	138
Mean dep. var (2000-03)	5.859	33.212	422.531	412.866	212.490	212.825	5.998	5.875
Pre-trends (p-value)	0.284	0.680	0.177	0.931	0.737	0.686	0.743	0.401
R-squared	0.998	0.999	0.395	0.642	0.354	0.704	0.700	0.830
Within R-squared	0.000	0.001	0.000	0.001	0.000	0.001	0.001	0.001
Panel B:	Big	Small	Big	Small	Big	Small	Big	Small
Post*Treated	4.589**	-0.122	32.750	20.333	17.444**	19.551	0.343*	-0.048
	(2.129)	(0.111)	(36.402)	(52.264)	(8.765)	(18.995)	(0.205)	(0.224)
Nxt	2520	1933	2520	1783	2520	1783	2056	1423
N	158	121	158	111	158	111	128	89
Mean dep. var (2000-03)	41.635	1.992	426.342	406.475	225.591	198.940	6.556	5.245
Pre-trends (p-value)	0.909	0.365	0.187	0.756	0.018	0.495	0.128	0.723
R-squared	0.998	0.784	0.703	0.466	0.805	0.594	0.813	0.569
Within R-squared	0.001	0.003	0.001	0.000	0.005	0.002	0.004	0.000

Notes: Two-way fixed effects regression. All estimations include firm, year, and grid fixed effects. Treated: $\leq 80km$, control: 80-150 km. Young firms are those with at most 5 years old. Big firms are those above the sample median of the number of employees. All the estimations include firm, grid, and time fixed effects. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6: Impact of the mining boom on entrepreneurship for different groups of residents, 2000-2015

	(1) Residents	(2) Population less 55 years	(3) Two-way clustering	(4) Employed	(5) Omit publicly employed workers	(6) Balanced panel	(7) Iron ore price
Post*Treated	0.006***	0.006***	0.006***	0.006**	0.008***	0.007***	
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	
Log(price)*Treated							0.002**
							(0.001)
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nxt	523436	384869	523436	402314	437634	306480	523436
N	32715	24054	32715	25145	27352	19155	32715
Mean dep. var (2000-03)	0.015	0.016	0.015	0.020	0.019	0.017	0.015
Pre-trends (p-value)	0.327	0.129	.	0.239	0.415	0.118	
R-squared	0.620	0.619	0.620	0.651	0.632	0.630	0.620
Within R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Two-way fixed effects regression. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7: Impact of the mining boom on economic outcomes of entrepreneurs for different groups of residents, 2000-2015

	(1) Residents	(2) Population less 55 years	(3) Two-way clustering	(4) Employed	(5) Omit publicly employed workers	(6) Balanced panel	(7) Iron ore price
Panel A: Yearly disposable income (1000SEK)							
Post*Treated	56.596***	51.011***	56.596***	59.221***	55.849***	61.214***	
	(10.346)	(13.631)	(10.346)	(11.325)	(10.323)	(14.043)	
Log(price)*Treated							32.125***
							(6.638)
Nxt	7632	5045	7632	6822	7495	5408	7632
N	477	315	477	426	468	338	477
Mean dep. var (2000-03)	179.593	178.119	179.593	182.539	179.579	176.100	179.593
Pre-trends (p-value)	0.266	0.485	.	0.380	0.223	0.426	
R-squared	0.355	0.376	0.355	0.351	0.360	0.352	0.355
Within R-squared	0.003	0.002	0.003	0.003	0.003	0.003	0.004
Panel B: Yearly labor earnings (1000SEK)							
Post*Treated	14.990	21.674**	14.990	24.369***	16.447*	26.063**	
	(9.150)	(9.403)	(9.150)	(8.037)	(8.966)	(10.137)	
Log(price)*Treated							6.490
							(5.594)
Nxt	7632	5045	7632	6822	7495	5408	7632
N	477	315	477	426	468	338	477
Mean dep. var (2000-03)	197.995	207.973	197.995	210.876	198.371	208.734	197.995
Pre-trends (p-value)	0.816	0.634	.	0.511	0.786	0.087	
R-squared	0.676	0.709	0.676	0.669	0.683	0.674	0.676
Within R-squared	0.002	0.004	0.002	0.005	0.002	0.005	0.001
Panel C: Yearly capital income (1000SEK)							
Post*Treated	46.368***	42.301***	46.368***	45.863***	44.384***	47.682***	
	(8.769)	(10.824)	(8.769)	(9.544)	(8.411)	(11.827)	
Log(price)*Treated							25.359***
							(5.909)
Nxt	7632	5045	7632	6822	7495	5408	7632
N	477	315	477	426	468	338	477
Mean dep. var (2000-03)	8.178	4.372	8.178	8.703	8.406	0.546	8.178
Pre-trends (p-value)	0.624	0.677	.	0.733	0.522	0.538	
R-squared	0.232	0.271	0.232	0.238	0.245	0.235	0.232
Within R-squared	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Panel D: Exit from entrepreneurship							
Post*Treated	-0.101***	-0.112**	-0.101***	-0.085**	-0.099***	-0.099**	
	(0.037)	(0.043)	(0.037)	(0.038)	(0.037)	(0.048)	

Log(price)*Treated							-0.025
							(0.028)
Nxt	3220	2301	3220	2943	3176	2120	3220
N	201	144	201	184	198	132	201
Mean dep. var (2000-03)	0.078	0.058	0.078	0.055	0.072	0.058	0.078
Pre-trends (p-value)	0.168	0.073	.	0.205	0.255	0.024	
R-squared	0.287	0.288	0.287	0.285	0.291	0.277	0.285
Within R-squared	0.004	0.005	0.004	0.003	0.004	0.004	0.001

Notes: Two-way fixed effects regression. All estimations include individual, grid, and year fixed effects. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.8: Robustness checks: impact of the mining boom on different definitions of entrepreneurship, 2000-2015

	(1) Baseline (incorporated)	(2) Incorporated + unincorporated	(3) Unincorporated
Post*Treated	0.006***	-0.013***	-0.019***
	(0.002)	(0.004)	(0.003)
Individual FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes
Nxt	523436	523436	523436
N	32715	32715	32715
Mean dep. var (2000-03)	0.015	0.048	0.033
Pre-trends (p-value)	0.327	0.029	0.117
R-squared	0.620	0.632	0.592
Within R-squared	0.000	0.000	0.001

Notes: Two-way fixed effects panel data regression. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.9: Robustness checks: impact of the mining boom on economic outcomes of entrepreneurs using other definition of entrepreneurship, 2000-2015

	(1) Disposable income	(2) Labor earnings	(3) Capital income	(4) Exit
Post*Treated	19.796***	18.000***	8.606**	-0.082
	(5.231)	(5.720)	(4.183)	(0.053)
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes
Nxt	15919	15919	15919	1044
N	995	995	995	65
Mean dep. var (2000-03)	124.505	19.802	2.584	0.025
Pre-trends (p-value)	0.628	0.335	0.680	0.148
R-squared	0.475	0.645	0.248	0.307
Within R-squared	0.002	0.003	0.000	0.004

Notes: Two-way fixed effects panel data regression. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.10: Robustness checks: impact of the mining boom on performance of entrepreneurs' firms using other definition of entrepreneurship, 2000-2015

	(1) Employment	(2) Value added per employee	(3) Wage costs per employee	(4) Asinh(operating profit)
Post*Treated	3.306	-12.558	-15.878	0.696***
	(3.181)	(82.264)	(16.779)	(0.196)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes
Nxt	10028	3851	3851	10028
N	627	241	241	627
Mean dep. var (2000-03)	17.829	568.695	195.330	4.928
Pre-trends (p-value)	0.802	0.092	0.161	0.461
R-squared	0.996	0.705	0.680	0.542
Within R-squared	0.000	0.000	0.001	0.002

Notes: Two-way fixed effects panel data regression. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

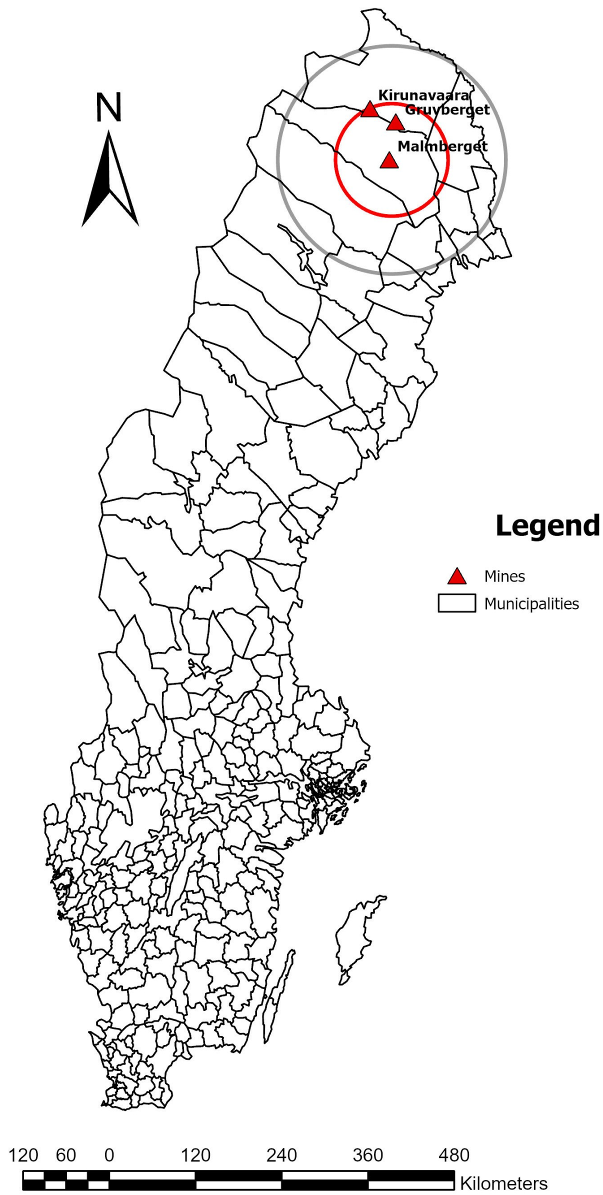
Table A.11: Robustness check: impact of the mining boom on entrepreneurship using distance time by car, 2000-2015

	(1) Residents	(2) Residents	(3) Residents	(4) Residents (duration 2003)	(5) Residents and migrants
Post*Treated	0.005**	0.005**	0.005**	0.005**	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Controls	No	Yes	No	No	No
Individual FE	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Grid FE	Yes	Yes	Yes	Yes	Yes
Nxt	523436	523436	523436	467765	566165
N	32715	32715	32715	29235	35385
Mean dep. var (2000-03)	0.015	0.015	0.015	0.015	0.015
Pre-trends (p-value)	0.265	0.318	0.583	0.295	0.225
R-squared	0.620	0.621	0.061	0.624	0.618
Within R-squared	0.000	0.002	0.000	0.000	0.000

Notes: Two-way fixed effects panel data regression. Standard errors (in parentheses) are clustered at the grid level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

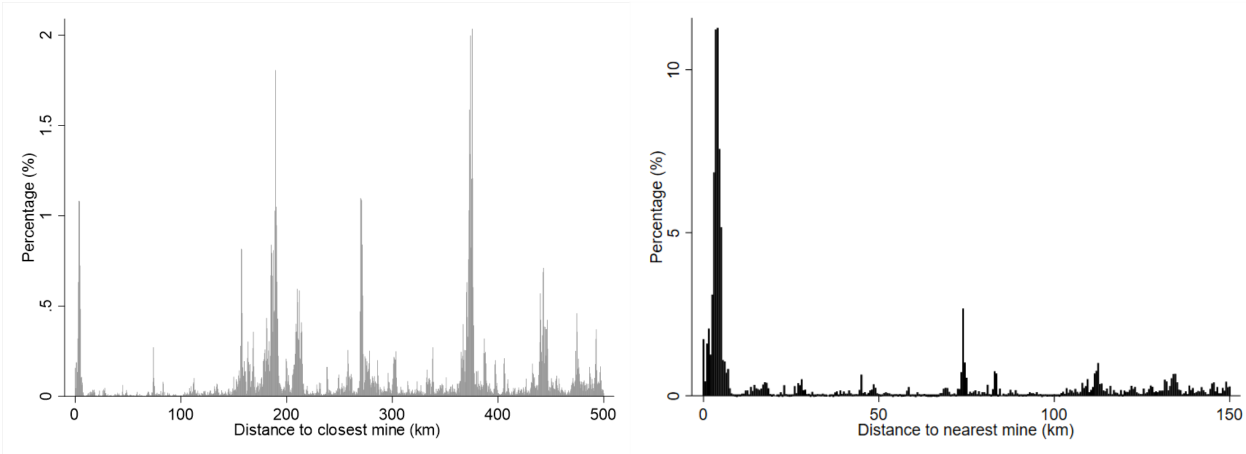
B Appendix: Additional figures

Figure B.1: Maps of mines and treated and control locations



Notes: The figure shows a map of the studied mines, the rings, and Sweden's municipalities. For simplicity, the red and grey rings are shown only for one mine, but in the paper are used for the three mines.

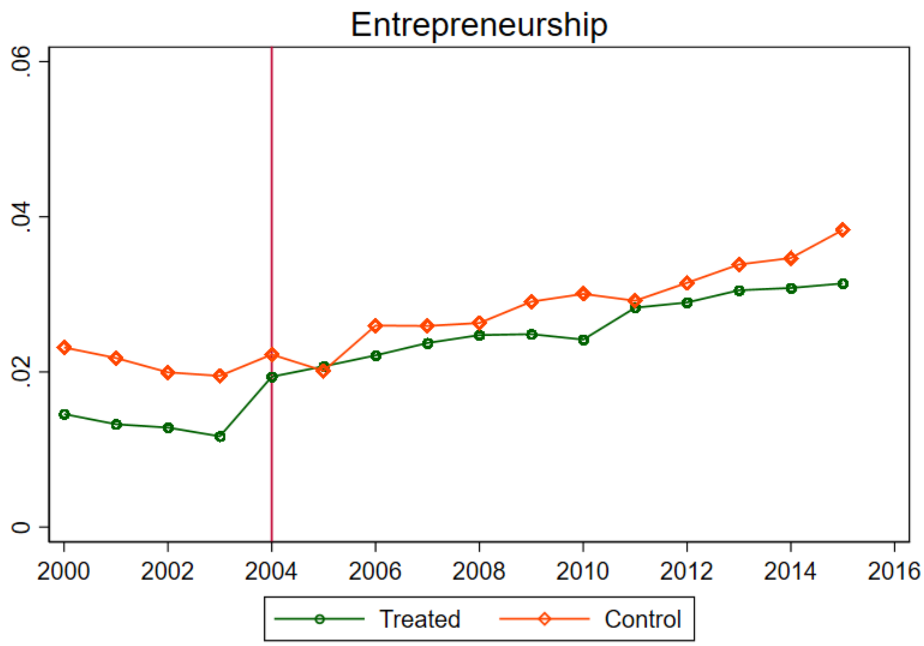
Figure B.2: Distribution of individuals according to their distance to the nearest mine



(a) Maximum 500 km (b) Maximum 150 km

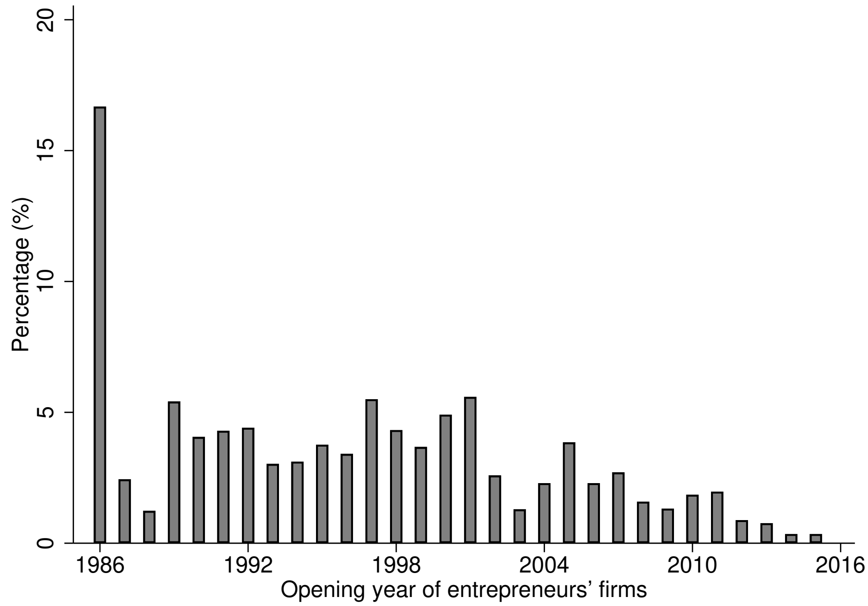
Notes: The figure shows the distribution of individuals according to their distance to the nearest mine at a maximum of 500 km and zooming into less than 150 km.

Figure B.3: Evolution of entrepreneurship rates by treated and control, 2000-2015



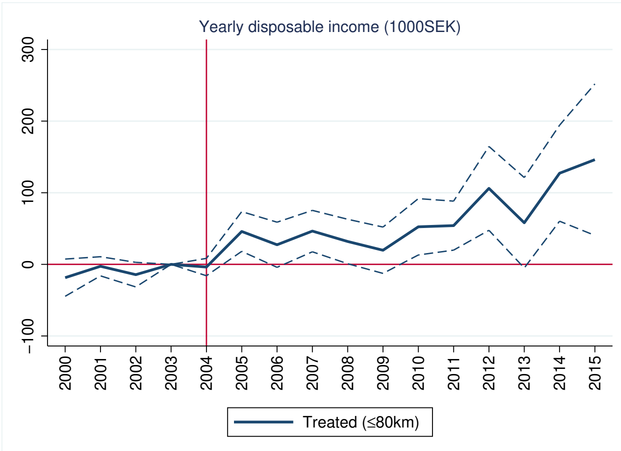
Notes: Treated: $\leq 80km$, control: 80-150 km.

Figure B.4: Opening year of entrepreneurs' firms



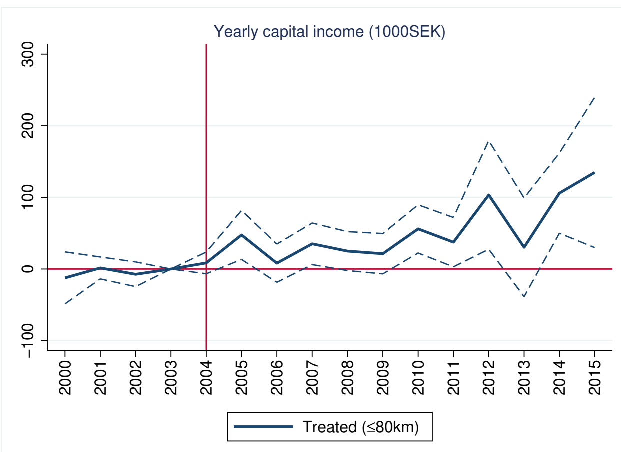
Notes: The figure shows the distribution in the sample of opening years of firms of entrepreneurs. The spike in 1986 is mechanical, as all firms established before that year are coded as starting in 1986.

Figure B.5: Event study of the impact of the mining boom on economic outcomes of entrepreneurs, 2000-2015

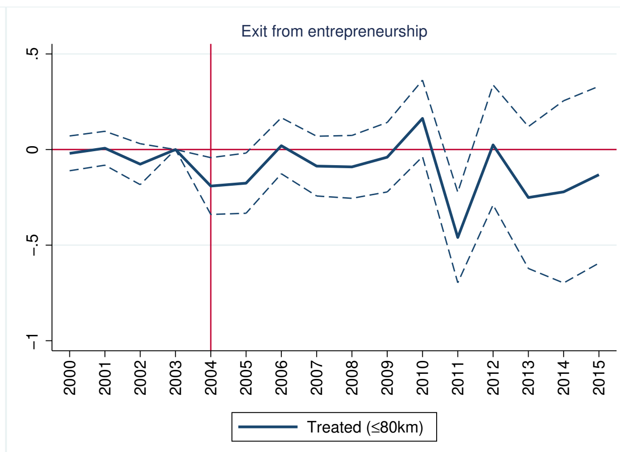


(a) Disposable income

(b) Labor earnings



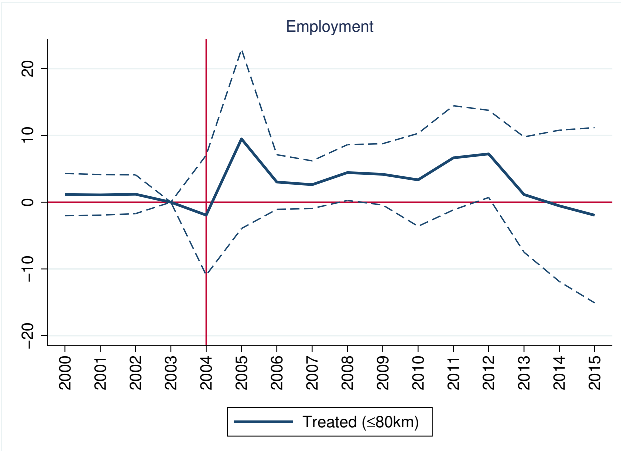
(c) Capital income



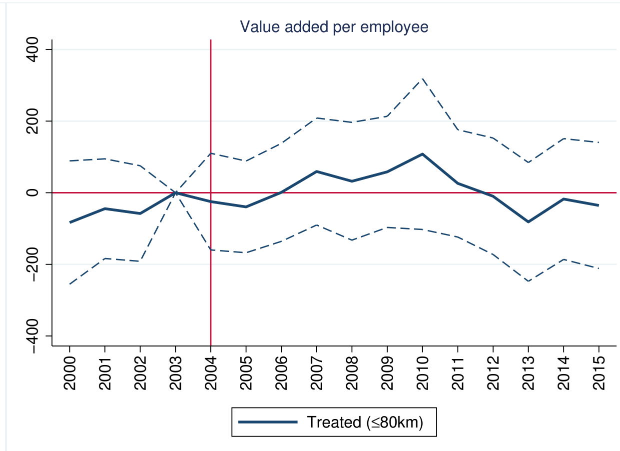
(d) Exit from entrepreneurship

Notes: Treated: $\leq 80km$, control: 80-150 km. Standard errors (in parentheses) are clustered at the grid level. All monetary variables are deflated to 2000 values using the national CPI and are analyzed in 1000 Swedish krona values. The year 2003 is the reference. 95% confidence interval shown.

Figure B.6: Event study of the impact of the mining boom on performance of entrepreneurs' firms, 2000-2015

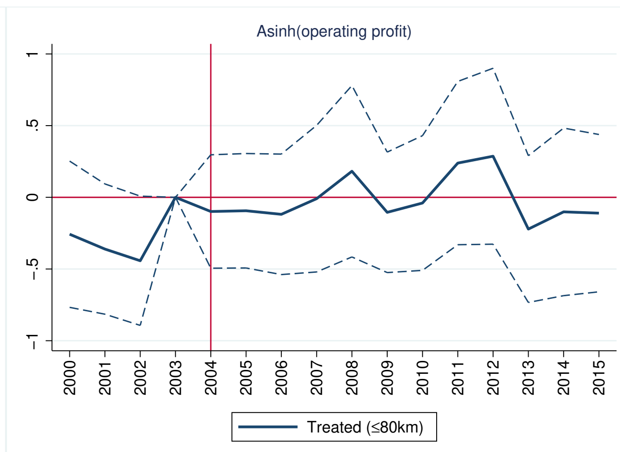


(a) Employment



(b) Value added

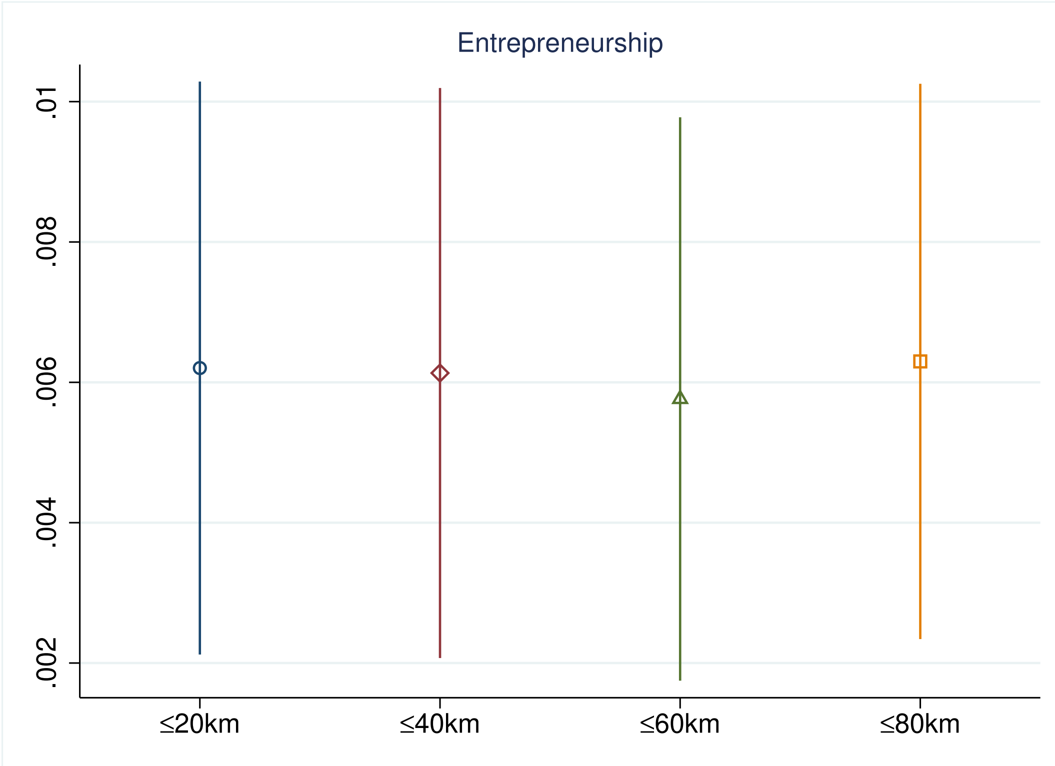
(c) Wage costs



(d) Asinh(operating profit)

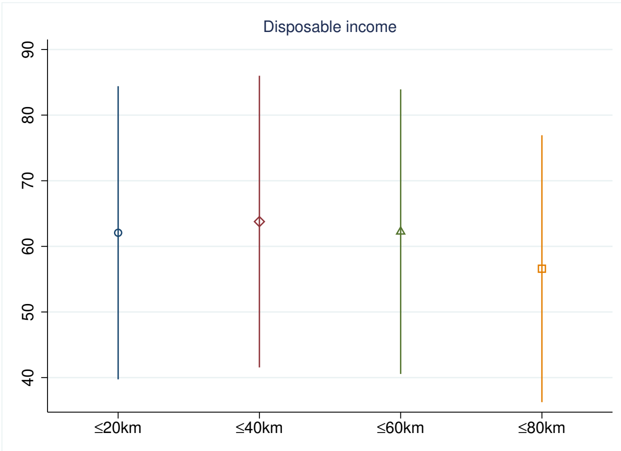
Notes: Treated: $\leq 80km$, control: 80-150 km. All the estimations include firm, grid, and time fixed effects. Standard errors (in parentheses) are clustered at the grid level. The year 2003 is the reference. 95% confidence interval shown.

Figure B.7: Robustness check: impact of the mining boom on entrepreneurship for treated at different distances

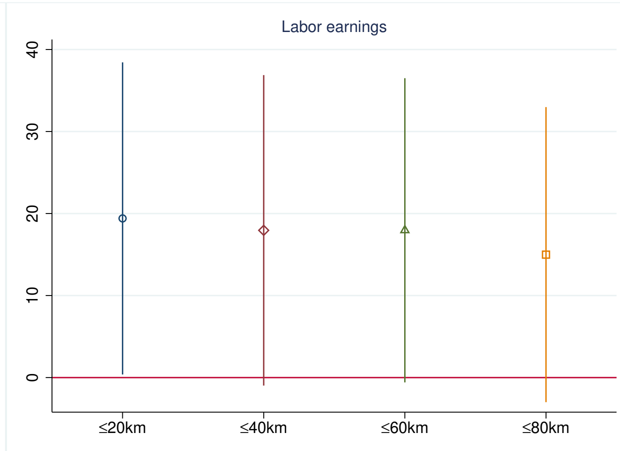


Notes: The figure shows the coefficient for Post*Treated. Each coefficient comes from a separate estimation. The control group is fixed for all specifications (80-150 km). 95% confidence interval shown. Estimations include individuals, grid, and time fixed effects. Standard errors are clustered at the grid level.

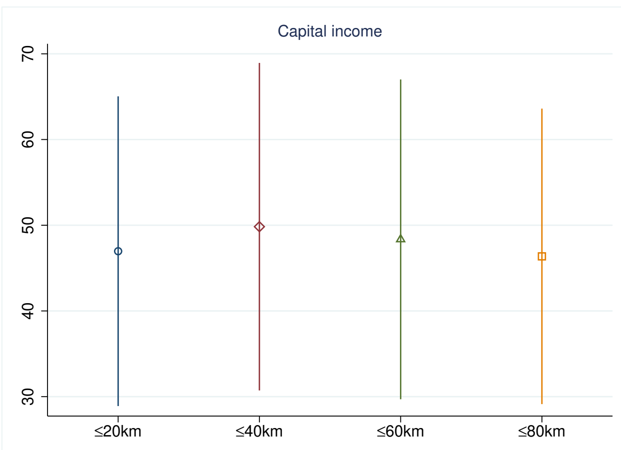
Figure B.8: Robustness check: impact of the mining boom on economic outcomes of entrepreneurs for treated at different distances, 2000-2015



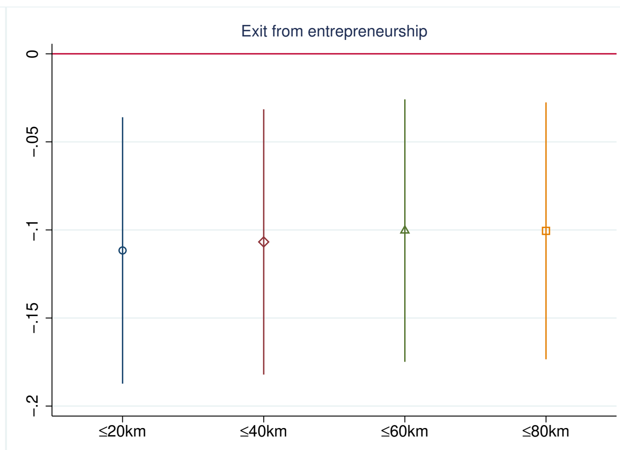
(a) Disposable income



(b) Labor earnings



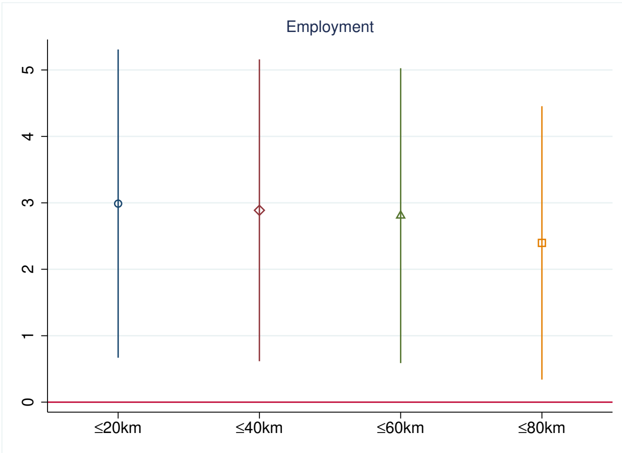
(c) Capital income



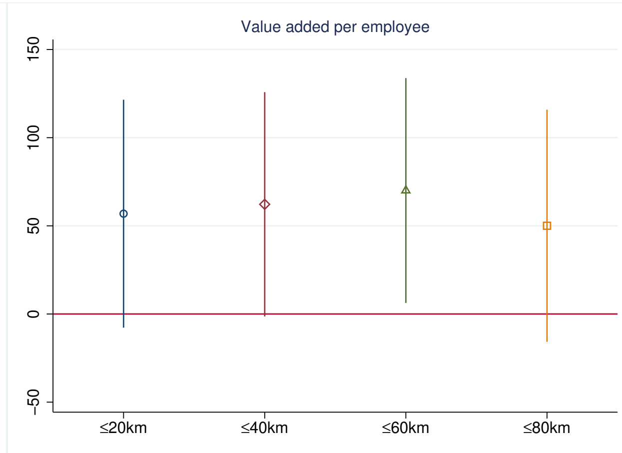
(d) Exit from entrepreneurship

Notes: The figure shows the coefficient for Post*Treated. Each coefficient comes from a separate estimation. 95% confidence interval shown. The control group is fixed for all specifications (80-150 km). Estimations include individuals, grid, and time fixed effects. Standard errors are clustered at the grid level. All monetary variables are deflated to 2000 values using the national CPI and are analyzed in 1000 Swedish krona values (in 1000 SEK).

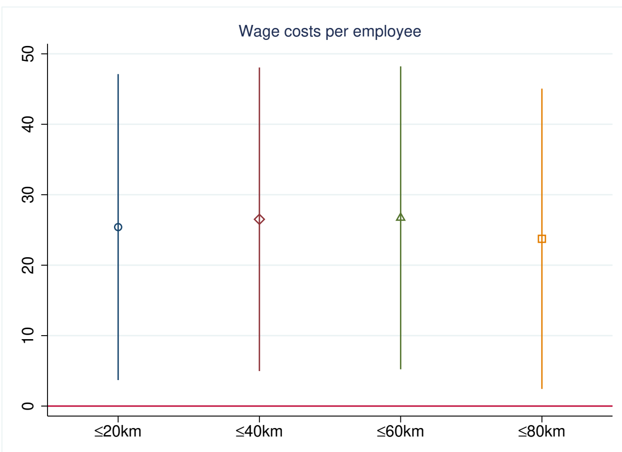
Figure B.9: Robustness check: impact of the mining boom on performance of entrepreneurs' firms for treated at different distances, 2000-2015



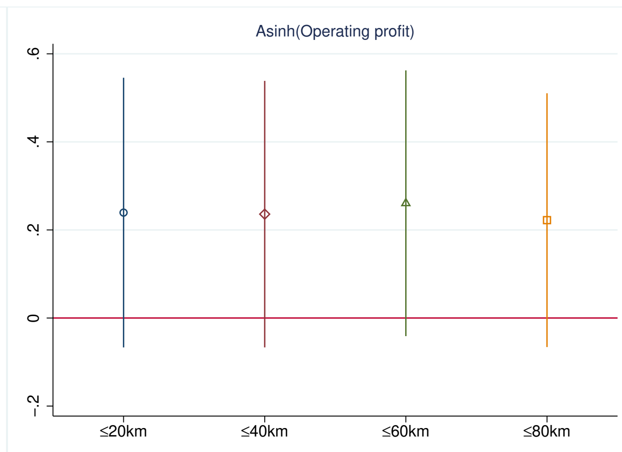
(a) Employment



(b) Value added



(c) Wage costs



(d) Asinh(operating profit)

Notes: The figure shows the coefficient for Post*Treated. Each coefficient comes from a separate estimation. 95% confidence interval shown. The control group is fixed for all specifications (80-150 km). Estimations include firm, grid, and time fixed effects. Standard errors are clustered at the grid level.